MARCH 14, 1955

the OIL AND GAS JOURNAL

SALEM FLOOD

200,000,000 bbl. secondary oil from simultaneous floods of five formations

Page 112

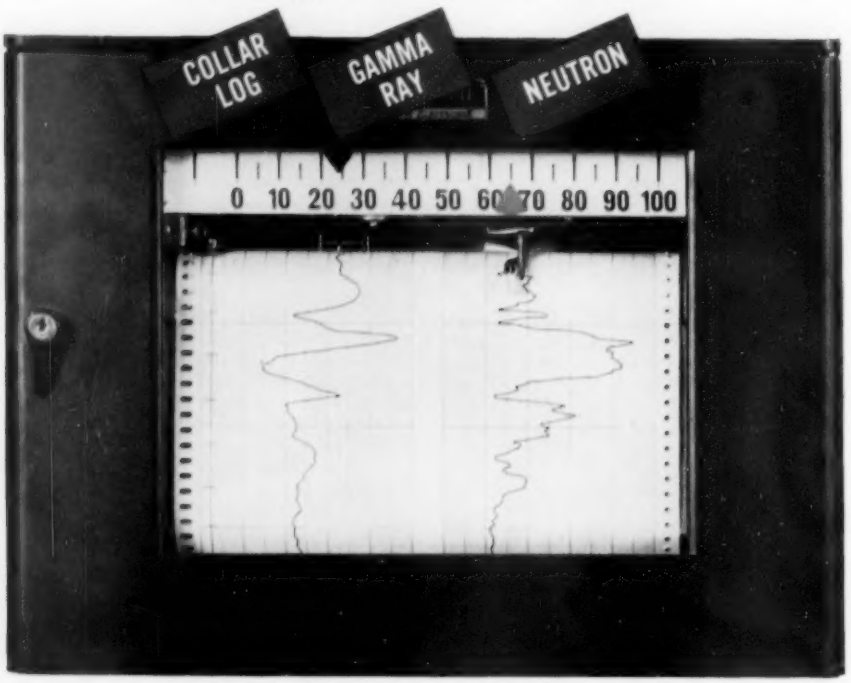
- **Canada Has Only Scratched the Surface . 76**
- **More Drouth Could Mean Trouble For Texas Producers . 82**

. . . some are already turning to unusual sources for cooling water.

Here's how

LANE-WELLS DUALIZED LOGGING

cuts your down-time



ALL 3 ON ONE RUN

And Lane-Wells DUALIZED Logging gives you the same sharp, fully-detailed curves as always, the same *complete* down-hole information which operators have found accurate and reliable in more than 60,000 Lane-Wells Radioactivity Well Logging jobs.

write for full information

LANE WELLS COMPANY
TECHNICAL OIL FIELD SERVICES

Radioactivity Well Logging

LR-83-A

General Offices, Export Office and Plant • 5610 So. Soto St. • Los Angeles 58, California

Los Angeles • Houston • Oklahoma City • Lane-Wells Canadian Co. in Canada • Petro-Tech Service Co. in Venezuela

PAGE 1 ONE . . . *a glance ahead*

Federal gasoline tax will be permanent if Eisenhower's $101-billion highway program is financed by bonds backed by road-user revenues; will rise sharply if Congress adopts pay-as-you-go method.

Bunker C fuel oil may prove practical for gas turbines. A large turbine maker is developing specifications and treating methods to reduce ash corrosion of blades, the chief obstacle to date. First test may be on a gas transmission line.

Argentine has not broken off dickering with several U. S. oil companies over exploration contracts. President Peron favors a deal but Y.P.F. bucks at prospect of competition. Peron is maneuvering for political support for entry of foreign capital.

Cheaper alkylates promised by new developments will permit wider use to boost octane and clean-burning character of premium motor fuels. Alkylate is now too expensive for this except in small quantities available after avgas requirements are fulfilled.

Biggest fight over Harris bill to exempt gas production from FPC will be on pipeline-produced gas. Consumer interests will oppose exemption of "utility gas" to bitter end, and many pipelines will oppose exempting independent producers unless their own gas gets same treatment.

Look for more drilling contractors to hire mud engineers as evidence accumulates that careful mud control has big effect on drilling rates. One West Texas contractor believes his full-time mud engineer far more than earns his salary.

Importing refrigerated natural gas by tanker from Middle East is being studied by Canadian government scientists to test suggestion that it might be cheaper than Alberta gas by pipeline in Maritime provinces.

Wage increases averaging about 4 per cent, now being offered by large oil companies, are expected to spread pretty generally through entire oil industry and be followed in most instances by proportional increases in salaries of nonunion employes.

the OIL AND GAS JOURNAL

MARCH 14, 1955 • VOLUME 53 • NUMBER 45

THE STAFF

TULSA OFFICE
211 South Cheyenne Avenue
Phone 3-6291

Kenneth B. Barnes ... Editor
Henry D. Ralph ... Chief Editorial Writer
Ted A. Armstrong ... News Editor
Gerald L. Farrar ... Engineering Editor
Dr. Frank J. Gardner ... Exploration Editor
Paul Reed ... Pipeline Editor
John C. Reidel ... Petrochemical Editor
C. O. Willson ... Consulting Editor
W. L. Nelson ... Technical Editor
Lynn M. Nichols ... Presentation Editor
John C. Casper ... Economics Editor
Neil Williams ... Associate Editor
Norman S. Morrisey ... Drilling-Development Editor
Edwin McGhee ... Drilling-Production Editor
Paul Swain ... Assistant News Editor
Robert G. Deering ... Assistant Pipeline Editor
R. B. Tuttle ... Equipment Editor
W. A. Franklin ... Assistant to Presentation Editor
Carl Hoot ... District Editor
Carl J. Lawrence ... District Editor
John C. McCaslin ... District Editor
John M. McGivern ... District Editor
Joe Reilly ... District Editor
LaWanda Turner ... Readership Research
Helen Brown ... Editorial Assistant
Alice Burt ... Editorial Assistant
Aileen Cantrell ... Editorial Assistant
C. Dudley Johnston ... Art Director
Nylajo Anderson ... Staff Artist
Jo Jeanne Speaker ... Staff Artist

NEW YORK OFFICE
500 Fifth Avenue
Phone LOngacre 4-6160

George H. Weber ... Refining Editor
Dahl M. Duff ... International Editor

HOUSTON OFFICE
802 Sterling Building
Phone CHarter 4626

F. Lawrence Rosen ... District Editor

DALLAS OFFICE
1238 Mercantile Bank Building
Phone STerling 3074

Robert J. Enright ... District Editor

LOS ANGELES OFFICE
630 South Grand Avenue
Phone VAndike 0722

D. H. Stormont ... District Editor

WASHINGTON OFFICE
621 Albee Building
Phone District 7-1710

Bertram F. Linz ... District Editor

Correspondents at Denver, Pittsburgh, Calgary, Columbus, Ashland, Ky., Oil City, Pa., Mount Pleasant, Mich., Melbourne, Australia; Regina, Sask.; Chatham, Ont.; and Casper, Wyo.

The Oil and Gas Journal, Published Mondays, copyright 1955, by The Petroleum Publishing Co. Entered as second-class matter September 1, 1910, at post office at Tulsa, Okla., under act of March 3, 1879. United States and foreign rates to the petroleum industry, 1 year $4, 2 years $7, 3 years $8.

IN THE NEWS

Canada Faces Almost Unlimited Future ... 76
Air Injection Cuts Down on Hydrogen Corrosion ... 80
Plastics Used Most Successfully in Line Pipe ... 81
Percussion Drill Looks Good in Field ... 81
Texas Drouth Makes Processors Keep Eye on Water ... 82
Oil Workers' Pay Raise Spreads Across Country ... 84
American-Louisiana May Lay Line This Summer ... 85
Transco Loops Will Use 315 Miles of 36-in. ... 86
First Morrow Pay in Hugoton Field Found ... 86
Operators Told How to Cut Drilling Costs ... 87
New Magnetometer-Mapping Plan Outlined ... 88
A.P.I. May Split Southwest Producing District ... 89
Magnolia Pipe Line Plans 215-mile Looping Project ... 90
Offshore Corrosion Problems Under Control ... 91
Florida's First Offshore Test Planned by Gulf ... 91
White House Dodges Support of Cabinet Report ... 92
Rubber Plants Sale Runs Into Opposition ... 92
Senate Heads for Import Quota Showdown ... 94
Colorado Considers 3 Per Cent Production Tax ... 96
More Companies Seek Interest in Iranian Oil ... 98
Pravda Is Unhappy With Russia's Oil Industry ... 98
U. S. Prepares to Build Major Pipeline in Spain ... 102

EXPLORATION FEATURES

Among the Drilling Contractors ... 155
Maps for Modest Budgets ... 179
$2,000,000,000 Worth of Seismic Cards ... 180
Exploration Highlights ... 181

DEPARTMENTS

They Say ... 57
Calendar of Events ... 64
Journally Speaking ... 71
Editorial ... 73
This Week ... 75
Watching Washington ... 95
International News ... 98
Books ... 111
Pipeline Patrol ... 147
Equipment Digest ... 159
Trade Literature ... 164
Equipment Men in News ... 170-222
Personals ... 209
Deaths in the Industry ... 212
Statistical Summary ... 213
Drilling Statistics ... 214
Supply Statistics ... 215
Refining Statistics ... 216
Demand Statistics ... 217
Monthly Statistics ... 218
Classified Advertising ... 219
Advertisers' Index ... 223

EXPLORATION • DRILLING • PRODUCTION • FIELD PROCESSING
OIL AND GAS PIPELINES • REFINING • PETROCHEMICALS

. . . an integrated magazine serving an integrated industry

TECHNOLOGY—OPERATION

Rising Cost of Storage Tanks 104
By C. V. Lynn

Proper selection, sound construction, efficient upkeep, and timely retirement are important considerations in dealing with oil-storage tanks. About three-fourths of the total refinery properties of one major company are occupied by storage facilities. Replacement cost, value of the real estate, foundations, dike walls, and auxiliary equipment amount to a tremendous capital investment and the value of stored products may be much greater.

Know Your Field Separators 107
By John M. Campbell

This first article in a series gives pointers in the selection of separators. If separators are properly sized and operated the loss of oils and rich vapors will be held to a minimum. The next few articles in the series will show the effect of pressure and temperature on separation, application of stage, and how to get top efficiency from other operations.

Salem Flood Is Conservation Mile Post 112
By Richard W. Love

Lake Centralia-Salem field is one of the largest units ever formed for water flooding. Over the expected 20-year life of the flood about 1.68 billion barrels of water will be injected. Now about 137,000 bbl. is injected daily into a modified peripheral type flood of 5 separate zones. Project covers about 8,300 acres and includes about 2,400 wells.

World's Longest Offshore Pipeline 118
By Clyde Aldridge and Carl Helm

The world's longest marine pipeline is scheduled to be completed this spring by Magnolia Petroleum Co. When finished the 12-in. crude line will run 48 miles into the Gulf of Mexico from the coast of Louisiana to pick up production in the Eugene Island area.

Velasquez Field Grows Steadily 123
By H. Tanner and W. O. Martin

Texas Petroleum Co. is gradually building Colombia's Velasquez field into one of that nation's major producing areas.

Inhibitor Solves Refinery Problems 126
By N. S. Banta and C. A. Murray

Fouling has been reduced and pressure drop maintained at a low value in the overhead condensing equipment of a T.C.C. unit by addition of a chemical inhibitor. Before the inhibitor was used products of corrosion lodged in tube bundles and caused excessive pressure drops. Shutdowns for cleaning were required every 3 to 4 months. In another case, a troublesome emulsion was formed in a gas-gasoline-water separator. After addition of an emulsifying chemical and corrosion inhibitor emulsion was broken and separation obtained.

Improved Mud for New Mexico 128
By W. E. Schultz

The mud problems in the Central Basin platform area of New Mexico are divided into three groups depending upon the casing program used. The program needed in a particular field depends on well depths, lost circulation, and high pressure gas. The incompetent red sand and shale beds all affect the casing programs.

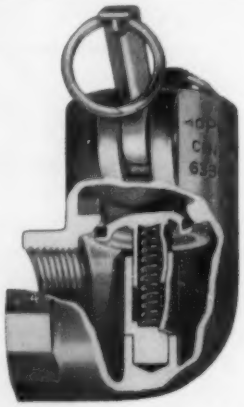
Pipeline Patrol 147

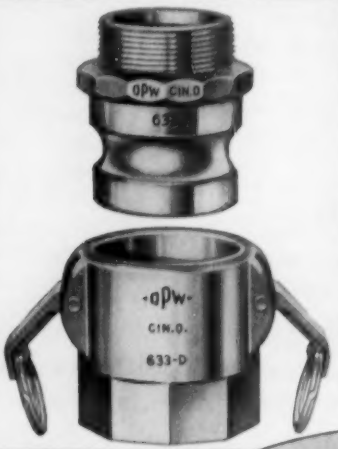
What to expect from radiographic well inspection—this technique can be extremely helpful in getting good welding on a pipeline job. But the emphasis must be on quality rather than quantity.

REGULAR FEATURES

Nelson's Refinery Construction Index 117
Engineering Reference Section 136-145
Equipment Design and Operation 136
Technical Questions 139-141
Instruments 141-142
Modern Drilling 145

KAMLOK COUPLING ASSEMBLIES





The Fastest Surest Coupling Known!

KAMLOKS positive seal all along the line assures *greater safety* in handling any type of liquid. A perfectly tight no leak connection is made in seconds by sliding coupler over adaptor, then pressing cam levers. No threads to engage, no twisting friction against gaskets, no tools required. KAMLOKS provide long years of economical trouble free service.

Available in any combination to meet coupling requirements in sizes from ¾" to 4" inclusive. Sizes ¾" to 3" precision machined of special hard wear resistant bronze. 4" size of hi-tensil OPALUMIN, (OPW hi-tensil aluminum alloy requiring no additional heat treating). 4" in bronze on special order.

Parts A, E, F, are interchangeable with parts B, C, D, G, H, in the same size.

WRITE FOR BULLETIN F-10 for the KAMLOK story.

OPW CORPORATION FOR HANDLING HAZARDOUS LIQUIDS — OPW — VALVES • FITTINGS • ASSEMBLIES — CINCINNATI 25, OHIO

BRONZE • ALUMINUM • MONEL

OPW CORPORATION

2731 COLERAIN AVE. • CINCINNATI 25, OHIO

Here's Rope that takes the toughest service!

MONARCH WHYTE STRAND Wire Rope by MACWHYTE

This top quality Rope is available in all classifications—in the size and construction that will serve best on your equipment. MONARCH WHYTE STRAND is highest strength Wire Rope, made of Improved Plow Steel.

To meet the needs of all equipment and the toughest of service conditions, there are a thousand and one types, sizes, and grades of MONARCH WHYTE STRAND Rope. Each of the Wire Ropes in this selection is designed to fill an equipment need and to assure longer, safer service at lower operating cost.

These Ropes are available Internally Lubricated, PREformed, Lang Lay or Regular Lay, Fiber Core, or Independent Wire Rope Core. Wire combinations vary from 42 wires in 6 x 7 construction to 343 wires in 6 x 49 IWRC construction.

Put MONARCH WHYTE STRAND Wire Rope on your equipment. Enjoy the advantages of having the rope that will take the toughest service.

Ask for
MONARCH WHYTE STRAND
Bulletin 5425.

For the proper Wire Rope size and construction for your equipment, request a Macwhyte recommendation.

MACWHYTE

WIRE ROPE · SLINGS · WIRE ROPE ASSEMBLIES

Macwhyte Company • 2916 Fourteenth Avenue • Kenosha, Wisconsin

Manufacturers of: Internally Lubricated, PREformed Wire Rope; Braided Wire Rope Slings; Aircraft Cable and Assemblies; Monel Metal, Stainless Steel Wire Rope; and Wire Rope Assemblies.

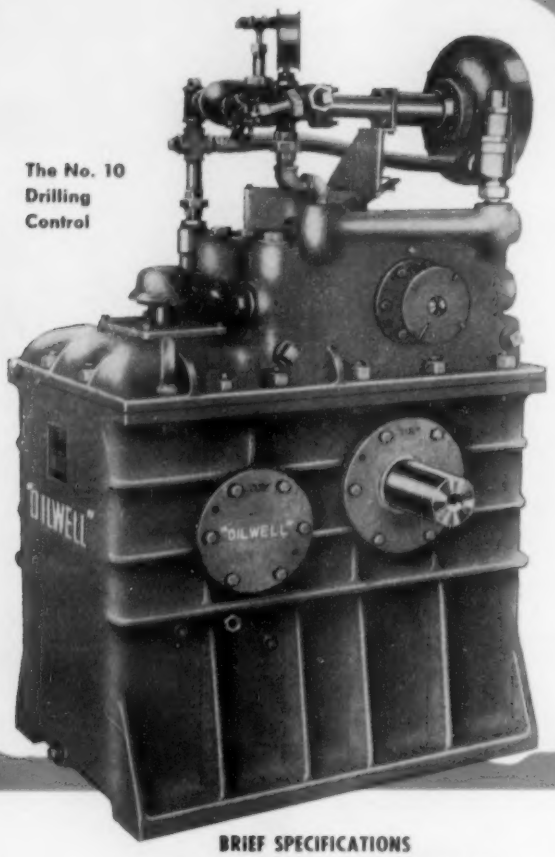
MILL DEPOTS:
New York 4, 35 Water Street
Pittsburgh 19, 704 Second Avenue
Chicago 6, 228 So. Desplaines Street
St. Paul 14, 2356 Hampden Avenue
Ft. Worth 1, P.O. Box 605
Portland 9, 1603 N.W. 14th Avenue
Seattle 4, 87 Holgate Street
San Francisco 7, 141 King Street
Los Angeles 21, 2035 Sacramento Street

See "Oilwell's" NEW Drilling Control

with POSITIVE

HYDRAULIC Feed-Off

built without friction elements



The No. 10 Drilling Control

"OILWELL'S" No. 10 Automatic Drilling Control is completely new in its design, yet utilizes the same hydraulic principles which have proven so effective on No. 15 "Oilwell"-Brantly Automatic Drilling Controls for so many years—resulting in straighter hole and fewer round-trips.

This new unit is of compact construction, for use on rigs for drilling to depths of 10,000 feet.

Two speed ratios enable the driller to secure extremely accurate control of bit weights with light as well as heavy drill-string loads. This makes the automatic regulator equally effective throughout both weight ranges.

This smaller No. 10 unit, like its larger companion the No. 15, can be used with any make draw works.

GET THE COMPLETE STORY . . . on Automatic Drilling Controls from your nearest "Oilwell" representative . . . or request your copy of Booklet No. 4-54.

BRIEF SPECIFICATIONS

Showing Relative Data for No. 10 and No. 15 Units

Drilling Control Model	No. 10	No. 15
Recommended Drilling Depth.....feet	To 10,000	Over 10,000
Gearing—Overall Ratio: High Speed.....	46.16:1	85.8:1
Low Speed.....	32.11:1	51.6:1
Pump: Number of Cylinders.....	5	6
Bore.....inches	2	1¾
Stroke.....inches	1⅞	2
Lubrication: Capacity of Gear Case.....gallons	36	32
Dimensions: Overall Length.....	3'4"	8'0"
Overall Height.....	3'11½"	3'7"
Overall Width.....	2'10"	3'5½"
Weight (Complete with Automatic Regulator):		
Domestic.....pounds	2,912	5,710
Export.....pounds	3,212	6,490

OIL WELL SUPPLY
DIVISION
UNITED STATES STEEL CORPORATION

Executive Offices—DALLAS, TEXAS
Export Office—
30 ROCKEFELLER PLAZA
NEW YORK 20, N. Y.

Area Offices—
CALGARY, CANADA
CASPER, WYOMING.....COLUMBUS, O.
DALLAS, TEXAS.....HOUSTON, TEXAS
TULSA, OKLA.....LOS ANGELES, CALIF.

Branches Serving All Oil Fields

USS

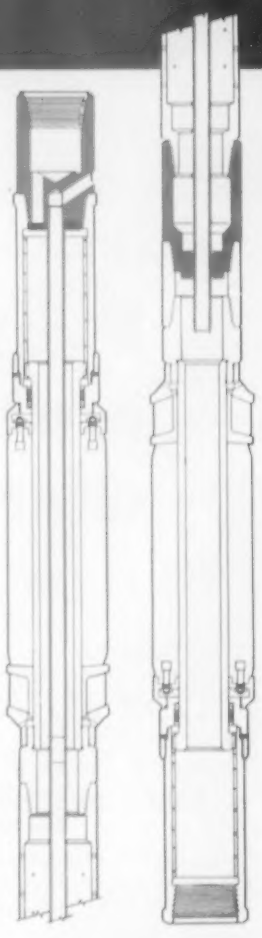
"OILWELL"

TRADE MARK

UNITED STATES STEEL

one of many reasons why

HALLIBURTON'S BEST
FOR YOUR DRILL STEM TEST!



You not only save time but help protect the formation, too, when this Pressure Equalizer is on the testing string. And that's exactly why Halliburton designed it for straddle packer tests.

The device equalizes pressure above and below the packers after they're set—adds a lot to the safety, accuracy, ease, and speed of the test. The by-pass permits testing string to go in hole faster and easier. And less time is lost if packers leak, for this is shown immediately at the surface and tools can be pulled for a re-run.

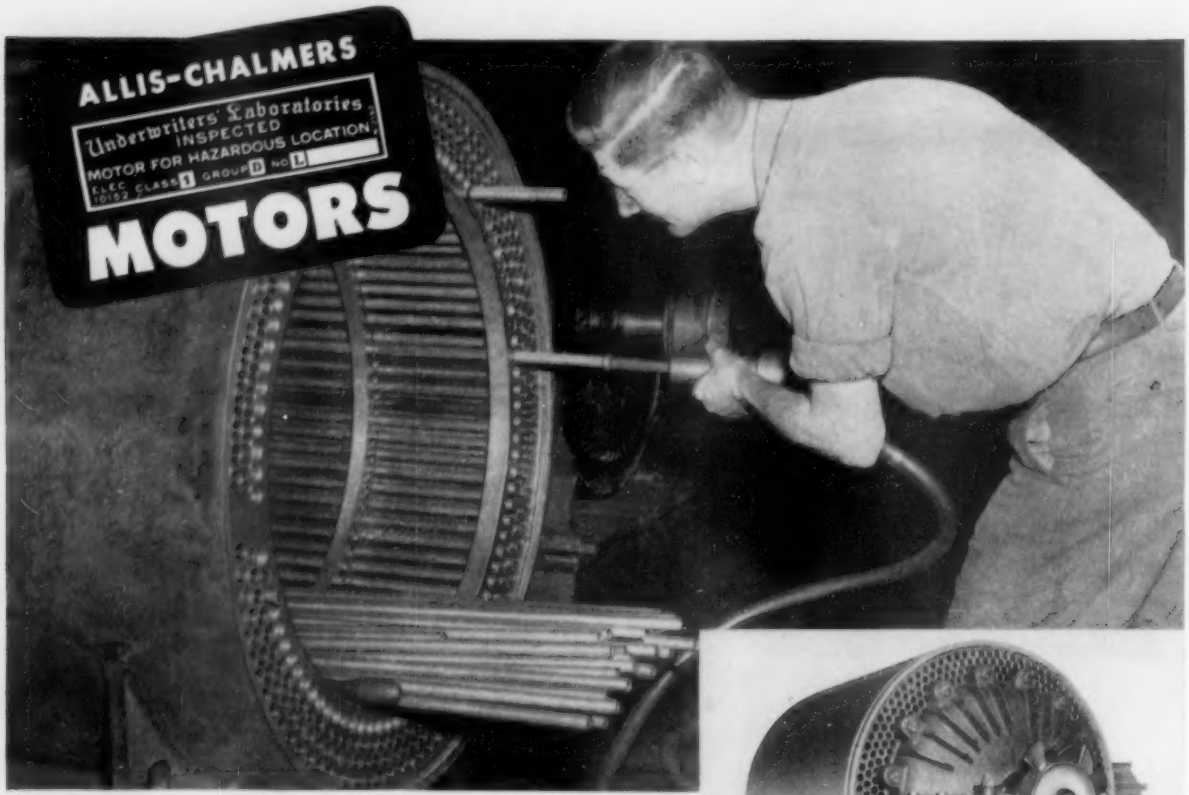
The Pressure Equalizer helps eliminate possibility of formation breakdown by hydraulic pressure, for no compression of fluid occurs as lower packer expands. And the chance of sloughing formation is minimized by making sure formation below packer is always subjected to hydrostatic pressure of drilling fluid.

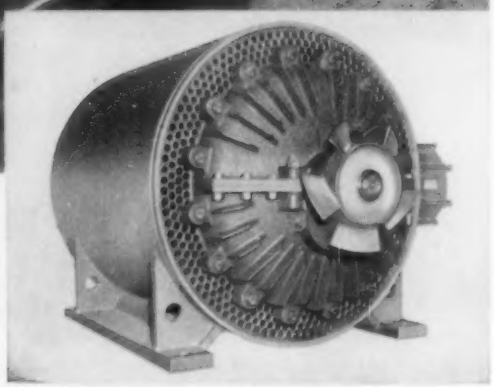
This tool is one of many fine things on Halliburton's testing string. Added to the benefits of Halliburton's Hydro-Spring Tester, Bourdon Tube Pressure Recording Device, and Hydraulic Adjustable Choke, there are hundreds of reasons why Halliburton's Best for your drill stem test.

Get this faster, safer, more accurate test—make your job easier, better, more successful—just phone your local or district office of the Halliburton Oil Well Cementing Company.

HALLIBURTON TESTING SERVICE

211 SERVICE CENTERS—JUST MINUTES AWAY FROM ANY RIG





3600-rpm explosion-proof motor with fan housing removed to show unidirectional fan.

These heat exchanger tubes

Protect this motor from dirt and corrosion

COOLING AIR is carried through the heat exchanger tubes with sufficient velocity to expel practically all kinds of dirt. If oily or sticky dirt should cling, tubes can be ramrodded clean on the spot in a few minutes because tubes are straight and tube ends are exposed. Also, the tubes are distributed uniformly around the perimeter of the stator yoke and along its full length — cooling all parts of the motor evenly.

Choice of Corrosion-resistant Materials

You can lick corrosion with this motor, too. Tubes are available in a variety of materials to meet practically any corrosive atmospheric condition. Allis-Chalmers tube-type motors have long and successful experience in such difficult applications as caustic plants, refineries and petrochemical plants, power plants with fly ash problems and many others.

Get Complete Information

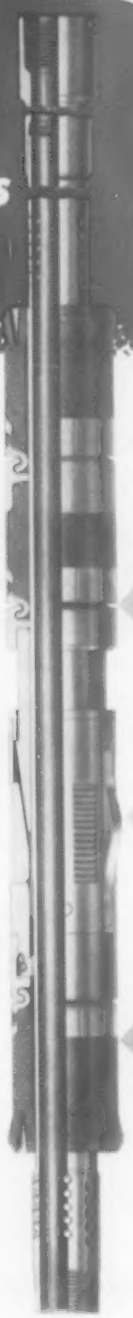
Next time you need a motor for a dirty or corrosive location or for outdoor operation in all kinds of weather, call your Allis-Chalmers District Office. Get complete information on Allis-Chalmers tube-type totally-enclosed, fan-cooled and explosion-proof motors. Or write Allis-Chalmers, Milwaukee 1, Wisconsin, for Bulletin 51B7149. Available in ratings on frames larger than NEMA 505 up to 3000 hp (labelled through 1250 hp, 1800 rpm).

A-4558

ALLIS-CHALMERS

THE BROWN DUO-PAK PACKER

ALL Purpose Packer for ALL Producing Problems



DUAL COMPLETE WITH IT

TEST WITH IT

ACIDIZE WITH IT

ASSURED SETTING

HOLDS HIGH DIFFERENTIALS

MINIMIZES UNSEATING FROM BELOW

Easy to Run

Easy to Set

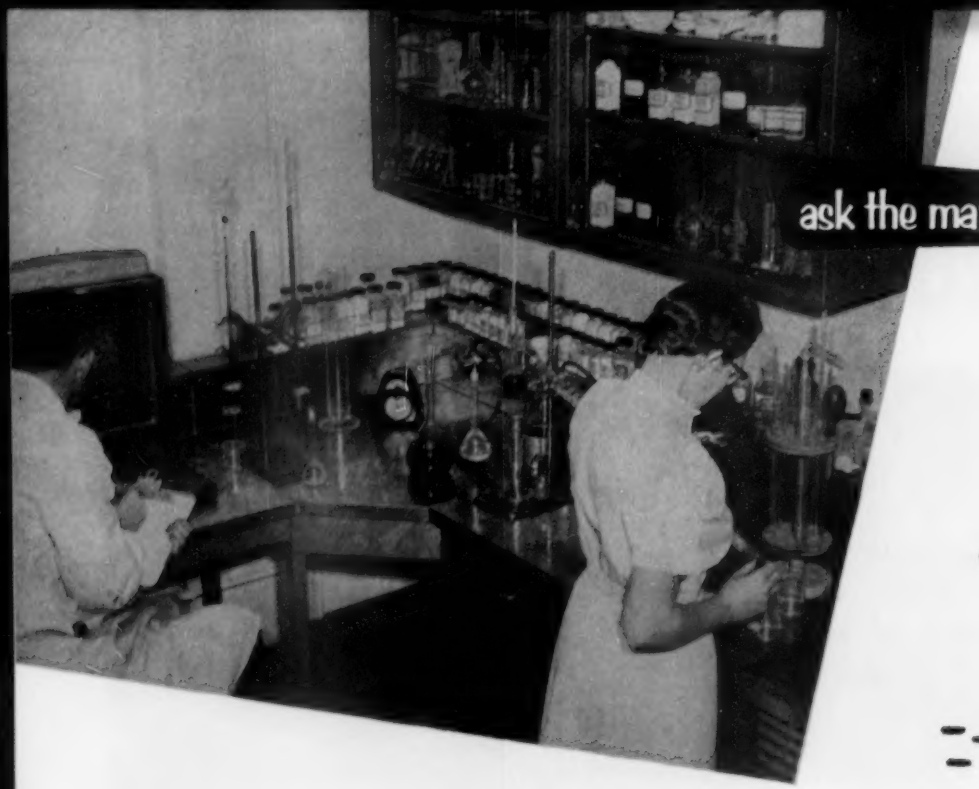
Easy to Retrieve

This all-purpose packer will handle all your producing and stimulating problems. Easy to run because of the large by-pass ports which prevent piston action. Easy to set without left hand rotation, and easy to retrieve without rotation. All working parts are enclosed and are not affected by debris, or corrosive fluids and gases.

Have your Brown Oil Tools representative show you the advantages and proved in the field reasons why the Brown Duo-Pak is the best buy today in packers.

BROWN OIL TOOLS, INC.

2216 CAMPBELL ST. HOUSTON, TEXAS



ask the man from Layne

research that serves . . . and saves!

Behind the far-flung field service of Layne Associate Companies is a Research Division that has many achievements to its credit. And most of these achievements are practical, usable, workable achievements that have resulted in better drilling methods . . . better equipment . . . better applications . . . better exploration practice . . . in short a betterment of all of the many phases of water development.

Layne Research not only serves . . . it saves . . . and municipalities, agriculture and industry know that it is good business judgment to "ask the man from Layne."

LAYNE & BOWLER, INC.
Memphis 8, Tennessee

Layne Associate Companies throughout the World

water wells • vertical turbine pumps • water treatment

SAVED $9000 PER WELL

by using new HY-T V-Belts with 3-T Cord

GOODYEAR INDUSTRIAL PRODUCTS
G.T.M.-Specified HY-T V-BELTS
for heavy-duty, high-shock-load drives
A
B
C
A. Multiple plies of chemically produced 3-T Cord, in neutral plane, carries a 40% greater horsepower load at speeds of 100 to 6000 feet per minute with practically no stretch — permits perfect matching.
B. Cushion section of durable rubber, especially compounded to give belt balanced construction.
C. Super-tough fabric cover is bias-cut, long-wearing, weather- and oil-resistant.
NOTE: Design shown applies only to HY-T V-Belts over 120" in length. Belts under 120" are of a single layer construction and are notched for cooler running under more severe flexing.

Hy-T—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

OPERATORS of the rig shown above had big problems with the big V-belt drive on the mud pump. Constant misalignment, heavy vibration, shock loads and the attacks of oil and weather combined to hold the standard belts they were using to an average life of one well-drilling—less than three weeks. And this was before they decided to double the horsepower of the drive to increase drilling speed and lower costs.

To help with this double-barreled problem of increasing production and service, the G.T.M.—Goodyear Technical Man—was called in. He recommended new HY-T V-Belts sinewed with Triple Tempered (3-T) Cord — synthetic cord "set" at its maximum strength and resiliency by a patented, triple-action tempering involving Tension, Temperature and Time.

So strong and shock-resistant are these new super-belts that they not only permitted the doubling of horsepower to *cut drilling time by more than a week,* but are still on the job after *two years*—drilling 5 to 6 wells per year. As a result, the drillers saved an average $9000 per well in operating expenses alone for a fabulous total of $100,000 plus, with more in store. For details on super-rated HY-T V-Belts, see the G.T.M., your Goodyear Distributor or write Goodyear, Industrial Products Division, Akron 16, Ohio, or Lincoln, Nebraska.

***YOUR GOODYEAR DISTRIBUTOR** can quickly supply you with Hose, Flat Belts, V-Belts, Packing or Rolls. Look for him in the yellow pages of your Telephone Directory under "Rubber Products" or "Rubber Goods."*

GOODYEAR

THE GREATEST NAME IN RUBBER

We think you'll like "THE GREATEST STORY EVER TOLD"—every Sunday—ABC Radio Network—THE GOODYEAR TELEVISION PLAYHOUSE—every other Sunday—NBC TV Network

JOB ENGINEERED FOR

HYDROCARBON LIQUIDS

Typical installation of SMITHway Vertical Turbine Pumps at a West Coast airport for a large oil company.

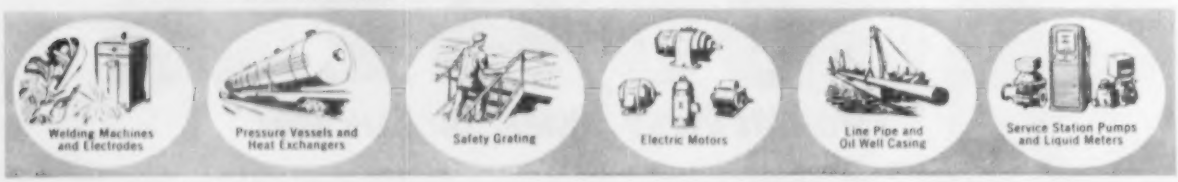
For more economical handling of hydrocarbon liquids get a "Job Engineered" installation. SMITHway short coupled vertical pumps, illustrated, can be used either to serve bulk loading racks at commercial airports or for high pressure direct refueling. These pumps are especially designed to handle crude oil, light fuel oil and liquefied gases as well as high octane aviation gasoline and jet fuels.

For complete information, see nearest representative or dealer.

Through research ... *a better way*

A.O.Smith
CORPORATION

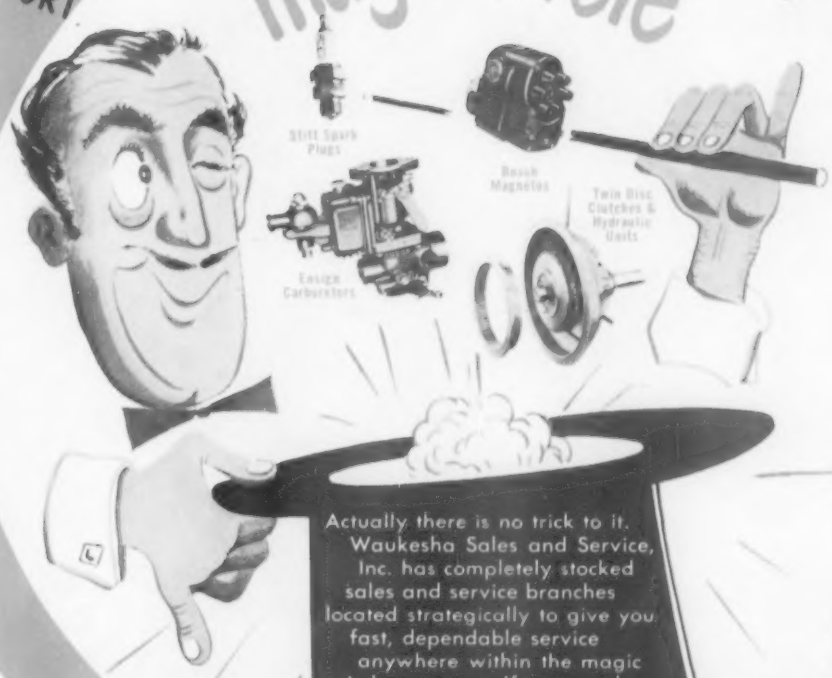
HYDRAULIC PRODUCTS
5715 Smithway St., Los Angeles 22, California
Offices in principal cities
International Division, Milwaukee 1


Welding Machines and Electrodes
Pressure Vessels and Heat Exchangers
Safety Grating
Electric Motors
Line Pipe and Oil Well Casing
Service Station Pumps and Liquid Meters

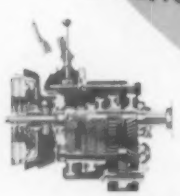
the Waukesha Sales & Service, Inc.

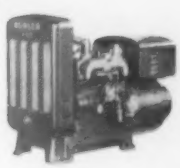
magic circle

NEW IBERIA
WICHITA FALLS
SAN ANGELO
McALLEN
HOUSTON
CORPUS CHRISTI
KILGORE
SNYDER
DALLAS
PAMPA
HOBBS
ODESSA
SHREVEPORT

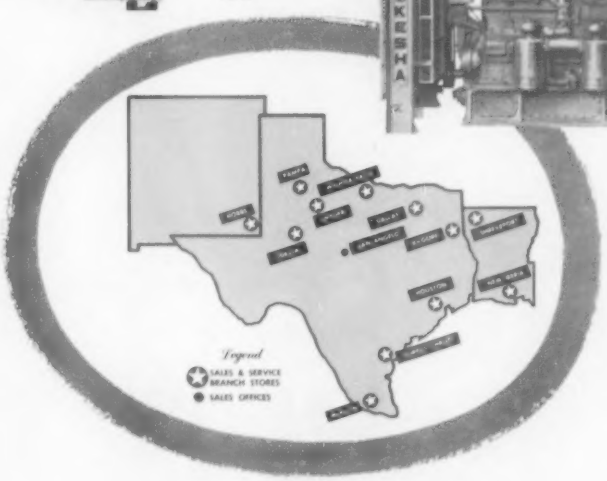


Actually there is no trick to it. Waukesha Sales and Service, Inc. has completely stocked sales and service branches located strategically to give you fast, dependable service anywhere within the magic circle we serve. If you need a new engine, a complete overhaul or the smallest part, your nearby Waukesha Sales and Service, Inc. branch is ready to help you 24 hours a day.


Spicer Transmissions and Parts


Kohler Electric Plants and Air Cooled Engines

YOUR WAUKESHA ENGINE
IS TREATED BEST AT HOME



WAUKESHA

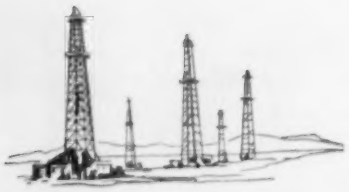
Sales & Service, Inc.

1422 MAURY ST. • HOUSTON, TEXAS

EXCLUSIVE DISTRIBUTORS FOR WAUKESHA PRODUCTS IN TEXAS, NORTH AND WESTERN LOUISIANA, SOUTHERN ARKANSAS AND NEW MEXICO

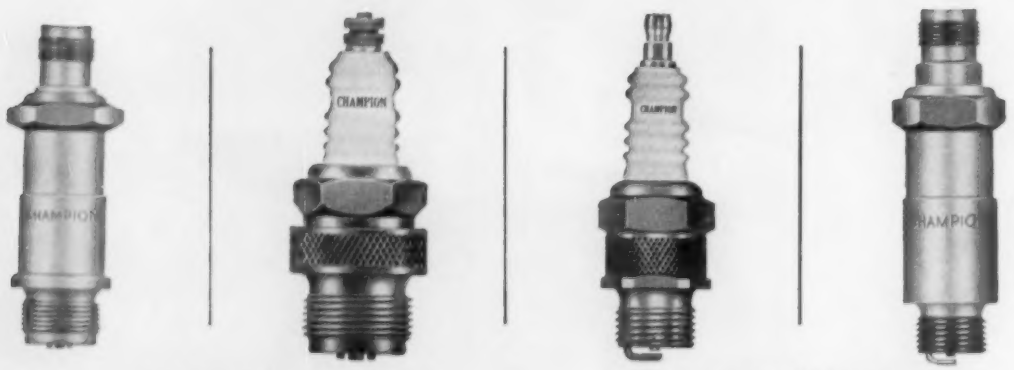
WORLD'S LARGEST DISTRIBUTOR OF OIL FIELD ENGINES

CHAMPION

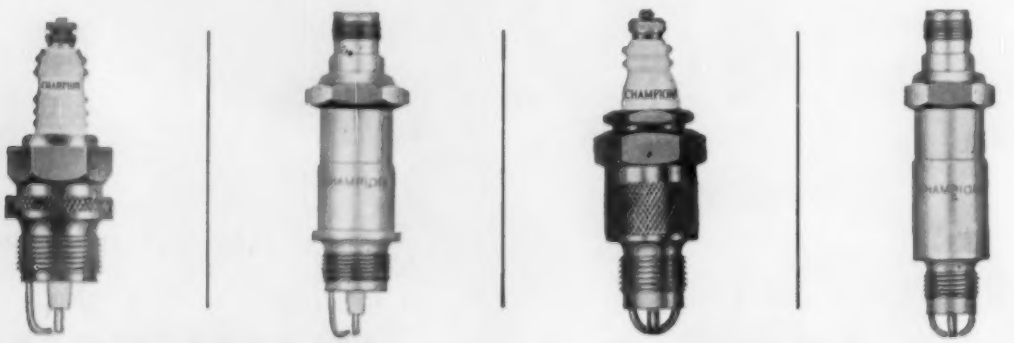


INDUSTRIAL AND OIL FIELD SPARK PLUGS ARE PRECISION ENGINEERED TO GIVE YOU

Long Service Under Tough Conditions



E-901 GAS ENGINE 901 6 COM. GASOLINE UNITS E-6 COM.



44 DIESEL STARTING E-44 D-8 HESSELMAN ED-8

Buy spark plugs shielded or unshielded to best suit your safety requirements—but make sure they're Champions for greater profits, safety and dependability. Champions have earned their reputation in the toughest industrial and oil field operations the world over.

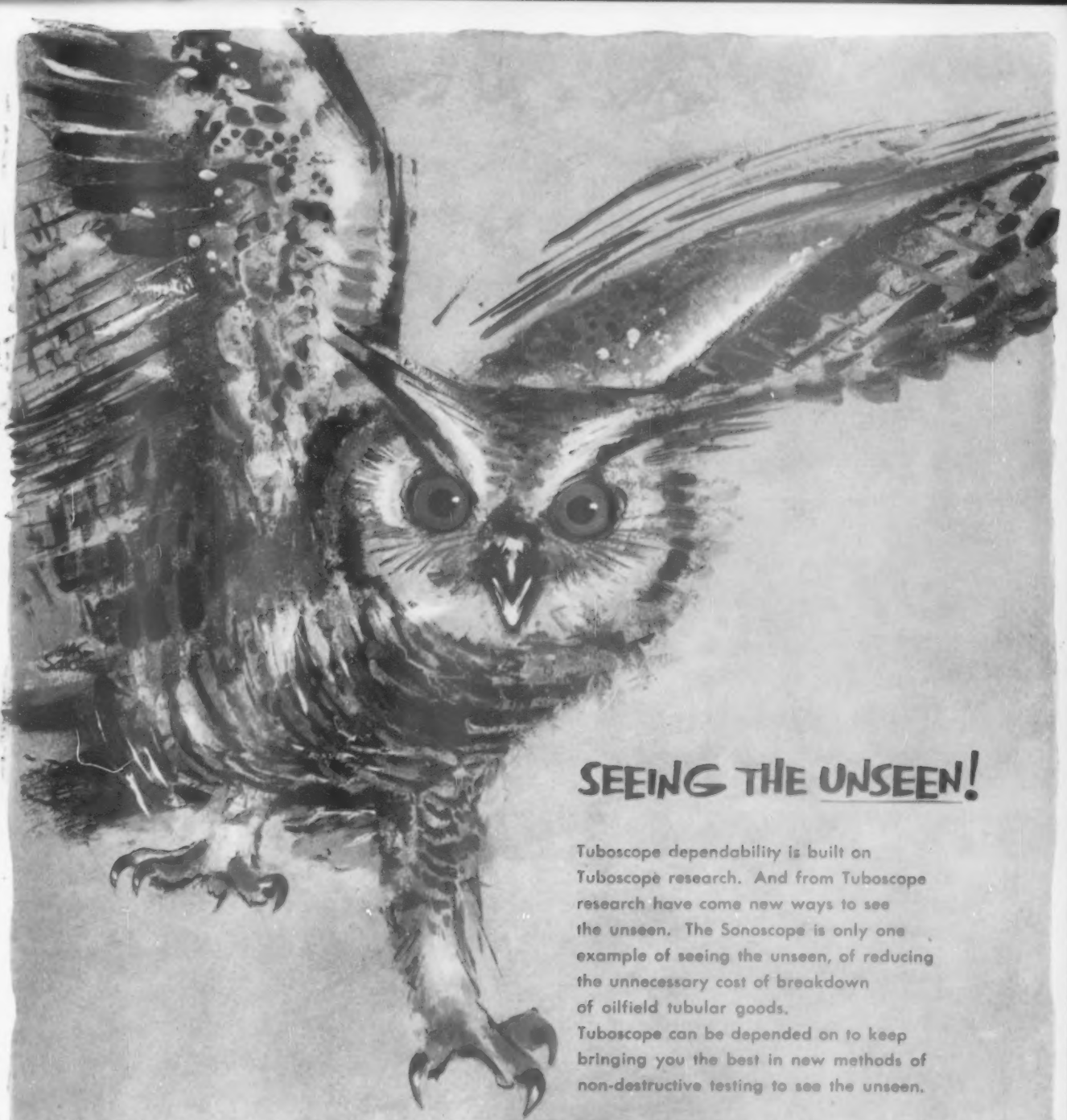
Only Champion offers a complete line of spark plugs for all industrial and oil field engines, gasoline, natural gas, Hesselman and diesel.

BEST FOR ANY ENGINE

CHAMPION

SPARK PLUGS

CHAMPION SPARK PLUG COMPANY, TOLEDO 1, OHIO



SEEING THE UNSEEN!

Tuboscope dependability is built on Tuboscope research. And from Tuboscope research have come new ways to see the unseen. The Sonoscope is only one example of seeing the unseen, of reducing the unnecessary cost of breakdown of oilfield tubular goods.
Tuboscope can be depended on to keep bringing you the best in new methods of non-destructive testing to see the unseen.

Tuboscope COMPANY

2400 HOLMES ROAD • HOUSTON, TEXAS

USE *Copon*... our revolutionary EPON® RESIN COATING

for POSITIVE PROTECTION of TANK AND PIPE INTERIORS

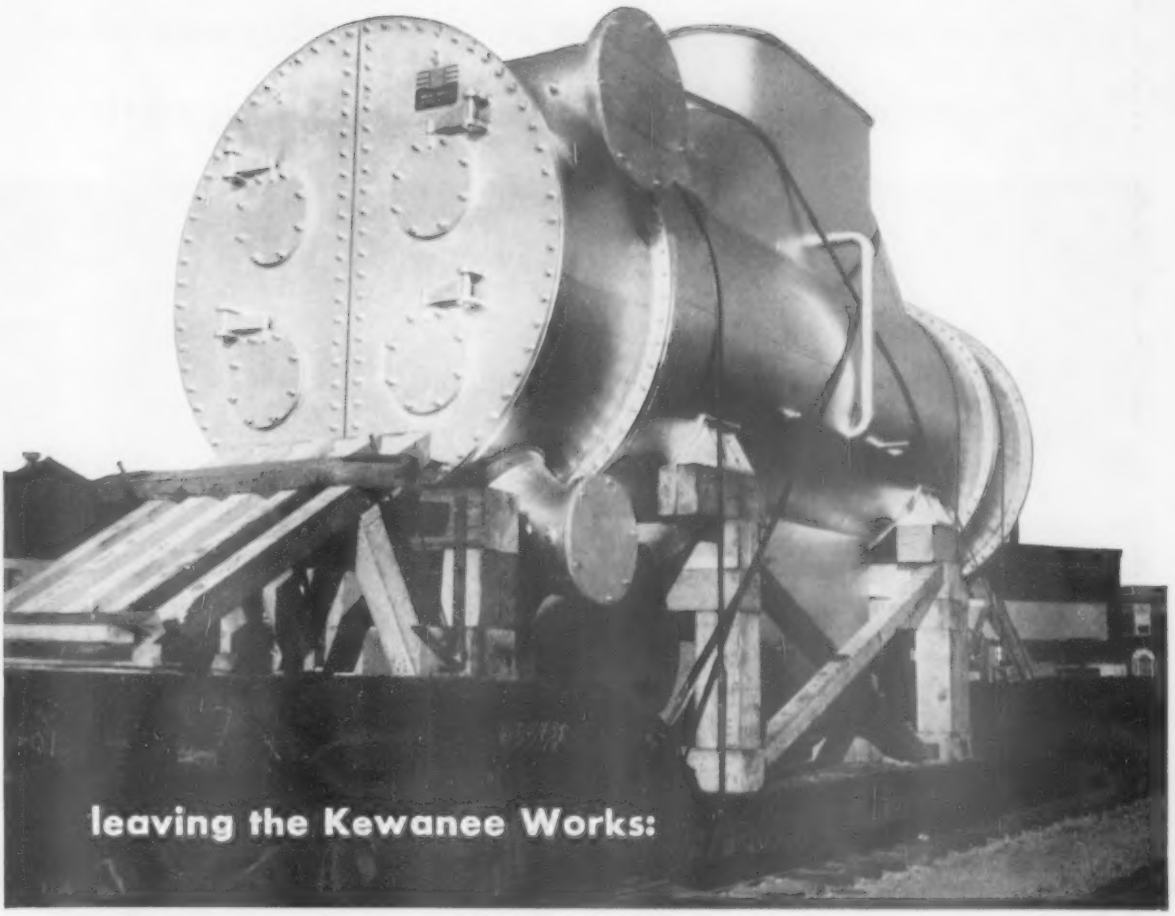
Here are the reasons why "Copon" is attracting the attention of leading corrosion and petroleum engineers:

- It has exceptional tenacity, will adhere to metal surfaces longer and under more difficult conditions than any other coating yet tested.
- It is abrasion-resistant and has proven low erosion rate.
- It gives positive protection against rust and corrosion, also the chemical effects of crude oil, natural gas and salt water.
- It has amazing flexibility and elasticity.
- It provides a silky smooth, even surface that increases line flow by reducing friction.
- It is easy to apply by spray, brush or pig method.

CPL

COAST Paint & Lacquer Co. Inc.

P. O. BOX 1113 • HOUSTON, TEXAS



ROSS SURFACE CONDENSERS TRAVEL TO ALL CORNERS OF THE WORLD

Leaving the Kewanee, Ill. plant, this Ross Surface Condenser is one of a pair bound for New Mexico. It's a relatively short trip compared to the distances that many Ross units have traveled to reach countries such as Australia, Brazil, Iran, Aruba, Sumatra . . . mentioning but a few. Their efficiency and dependability have been proved in remote and isolated locations all over the world.

The reason Ross Surface Condensers are widely preferred, for installations both in the U. S. and foreign countries, can be expressed in two words: *advanced engineering* . . . engineering that introduced the first all welded steel surface condenser at Parr Shoals, S. C. in 1929 and pioneered numerous other developments, including Balanced Flow and divided tube bank design.

It's only logical then, that Kewanee-Ross is best qualified to meet *your* surface condenser requirements, too. Consultation with Kewanee-Ross engineers will leave you assured of this.

KEWANEE-ROSS CORPORATION
DIVISION OF AMERICAN RADIATOR & STANDARD SANITARY CORPORATION
1417 WEST AVENUE • BUFFALO 13, N. Y.
In Canada: Kewanee-Ross of Canada Limited, Toronto 5, Ont.

ROSS SURFACE CONDENSERS

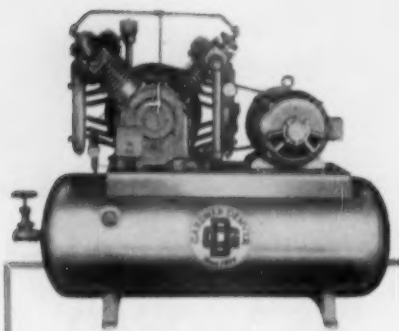
Serving home and industry: AMERICAN STANDARD • AMERICAN BLOWER • CHURCH SEATS & WALL TILE • DETROIT CONTROLS • KEWANEE BOILERS • ROSS EXCHANGERS • SUNBEAM AIR CONDITIONERS

Compressed air going to work on your rig?

...remember GARDNER-DENVER quality

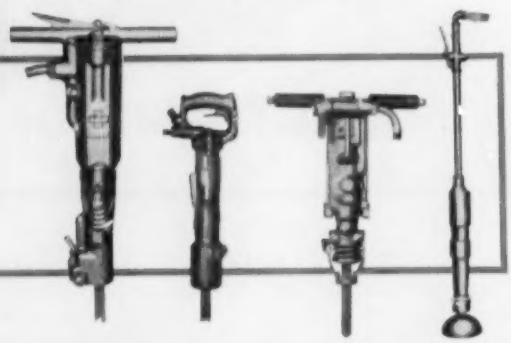
On air-drilling assignments, Gardner-Denver portable compressors operate continuously at any altitude, in any weather.

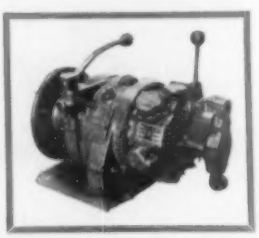
Compressed air power — muscle-saver on the new and modernized rigs — must be as dependable as every other item on the rig. That's why Gardner-Denver compressors, air hoists and tools are first choice among oil men who know Gardner-Denver quality.



Tank-mounted compressors with Timken roller main bearings and many other quality features. Compressors also available without air receiver.

Also hard-hitting breakers for concrete demolition — rock drills — tampers — spaders — sump pumps — and other useful air tools.





Powerful air hoists for lifting, pulling, maneuvering.

GARDNER-DENVER Since 1859 — KELLER TOOLS

GARDNER-DENVER

THE QUALITY LEADER IN COMPRESSORS, PUMPS AND ROCK DRILLS FOR CONSTRUCTION, MINING, PETROLEUM AND GENERAL INDUSTRY

Gardner-Denver Company, Quincy, Illinois

In Canada: Gardner-Denver Company (Canada), Ltd., 14 Curity Avenue, Toronto 16, Ontario

Dallas • Houston • Tulsa • St. Louis • Los Angeles • San Francisco • New York • Chicago • Pittsburgh • Denver • New Orleans
Continental Supply Co., Continental Bldg., Dallas, Texas. Export Division: 30 Rockefeller Plaza, New York, N. Y.
Republic Supply Co., (Of Calif.), 2600 S. Eastland Ave., Los Angeles, Calif.

For Heavy Pumping in corrosive fluids.

Jones Type 7 Rods are the standard of quality with many leading companies. Strong corrosion resistant Nickel Molybdenum steel is fully normalized, tempered and shot peened to gain further fatigue and corrosion resistance.

Furnished in double pin pattern only through your supply store. Write direct for details.

Here are Typical Physical Properties of Jones Type 7 Sucker Rods

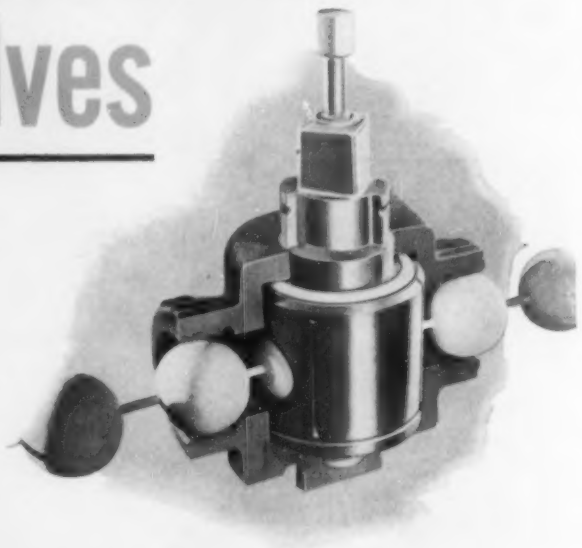
Yield (p.s.i.)	72,000
Ultimate (p.s.i.)	90,000
% Elong. 8"	20.0
% Red. of Area	65.0
Brinell Hardness	190
Charpy Impact	50
Izod Impact	98

JONES SUCKER RODS *last longer!*

PESA — Petroleum Equipment Suppliers Association — Partners in Petroleum Progress

THE S. M. JONES COMPANY
Division of Buffalo-Eclipse Corporation
General Office and Factory: **TOLEDO, OHIO**
Sales Office: Kennedy Building, **TULSA, OKLAHOMA**

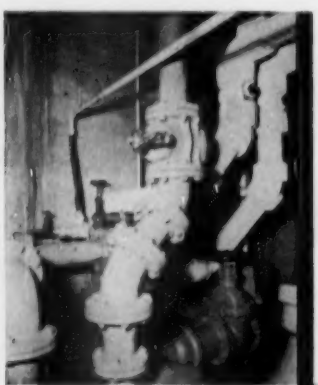
THE "HOLE" TRUTH ABOUT round port plug valves



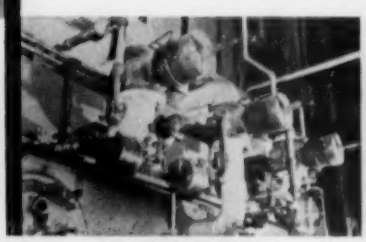
The truth is: no other opening will give you the flow perfection of a round hole! Because acf Round Port Valves are the exact size and shape as the pipe itself...you get smooth, unrestricted flow of even the most heavy viscous ladings. There are no obstructions...no loss in head pressure...no turbulence and harmful abrasive effects from solids in suspension.

Quarter-turn shut off! Full pipe area opening! Non-wedging design! All these features are found in *both* acf Round Port Valves and Rectangular Port Valves. Their extra long service life with minimum maintenance will save you money in the long run. And that's the truth!

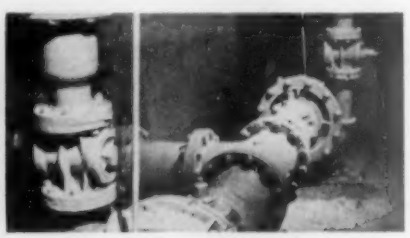
Representatives in 50 Principal Cities. Write for descriptive Catalog 5-OG, acf Industries, Incorporated, Valve Division, 1501 E. Ferry Avenue, Detroit 11, Michigan.



In Sewage treatment



In Steel Plants



In the Cement Industry

acf CYLINDRICAL FULL PIPE AREA PLUG VALVES

BEAIRD-INGERSOLL-RAND

Packaged Compressor Plant

Lowest Cost Per Horsepower Installed

GULF OIL CORPORATION installed a compressor station at its Runnels gasoline plant to produce remaining reserves from nearby low pressured wells. Since moving the installation at some future date is anticipated, portability has been obtained by equipping the station with two 550 h.p. Beaird-Ingersoll-Rand packaged compressor plants.

Each unit boosts gas from 5 to 800 psig for processing and delivery to the sales line. Designed with two stages of intercooling and with aftercoolers on the third stage discharge, the compressors saved the cost of installing and piping separately powered gas cooling. All coolers are mounted in the compressor radiator on the main skid as an integral part of the compressor plant. A single propeller type fan, belt-driven from the crankshaft, efficiently handles the entire gas cooling load — even when outside temperatures soar to 110 degrees.

The complete packaging of the compressor plants will mean further savings when the wells are depleted. Requiring a minimum in the way of foundation and connecting piping, the entire compressor installation will be nearly wholly salvageable when moved.

Let us show you how Beaird-Ingersoll-Rand packaged compressor plants can be designed to meet your special requirements.

Recover Reserves —

HOW PACKAGED COMPRESSORS MEET PORTABILITY NEEDS OF GASOLINE PLANT

GULF OIL CORPORATION'S Runnels Gasoline Plant, Wingate, Texas--equipped with two Beaird-Ingersoll-Rand 550 h.p. 10 SVG four cycle gas engine driven compressors, Young radiators and all necessary controls. Other sizes 110 to 660 h.p.

THE J. B. BEAIRD COMPANY, INC.

Shreveport, Louisiana

BEAIRD

MACHINING • MANUFACTURING • STEEL WAREHOUSE

PACKAGED COMPRESSOR PLANTS

CAST STEEL FITTINGS

PRESSURE BULK STORAGE

ANHYDROUS AMMONIA EQUIPMENT

LP-GAS SYSTEMS

NEW

EXTRA CAPACITY

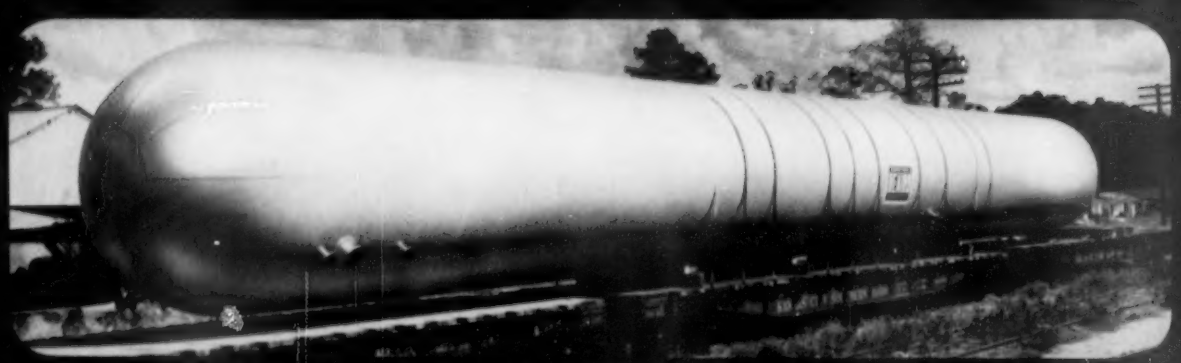
35,000 TO 75,000 GALLONS

BEAIRD PRESSURE STORAGE TANKS

... substantial savings can be made in ... storage plant installations by specifying Beaird ... Capacity Tanks — available in a range of sizes ... 35,000 to 75,000 gallons. Extra capacity ... storage will save installation cost by — eliminating expensive duplication of fittings, connecting piping and reducing operating manpower. Designed to your individual plant requirements, Beaird Extra Capacity Pressure Storage Tanks provide maximum storage at lowest cost per gallon.

Other Beaird Pressure Storage Tanks are available in a range of standard sizes from 2,000 to 30,000 gallons. All pressure tanks are inspected, tested and stamped. Modern radiographic equipment at Beaird has put X-ray on a production line basis.

Write today for further information or quotation on Beaird Pressure Storage Tanks designed to fit your requirements.



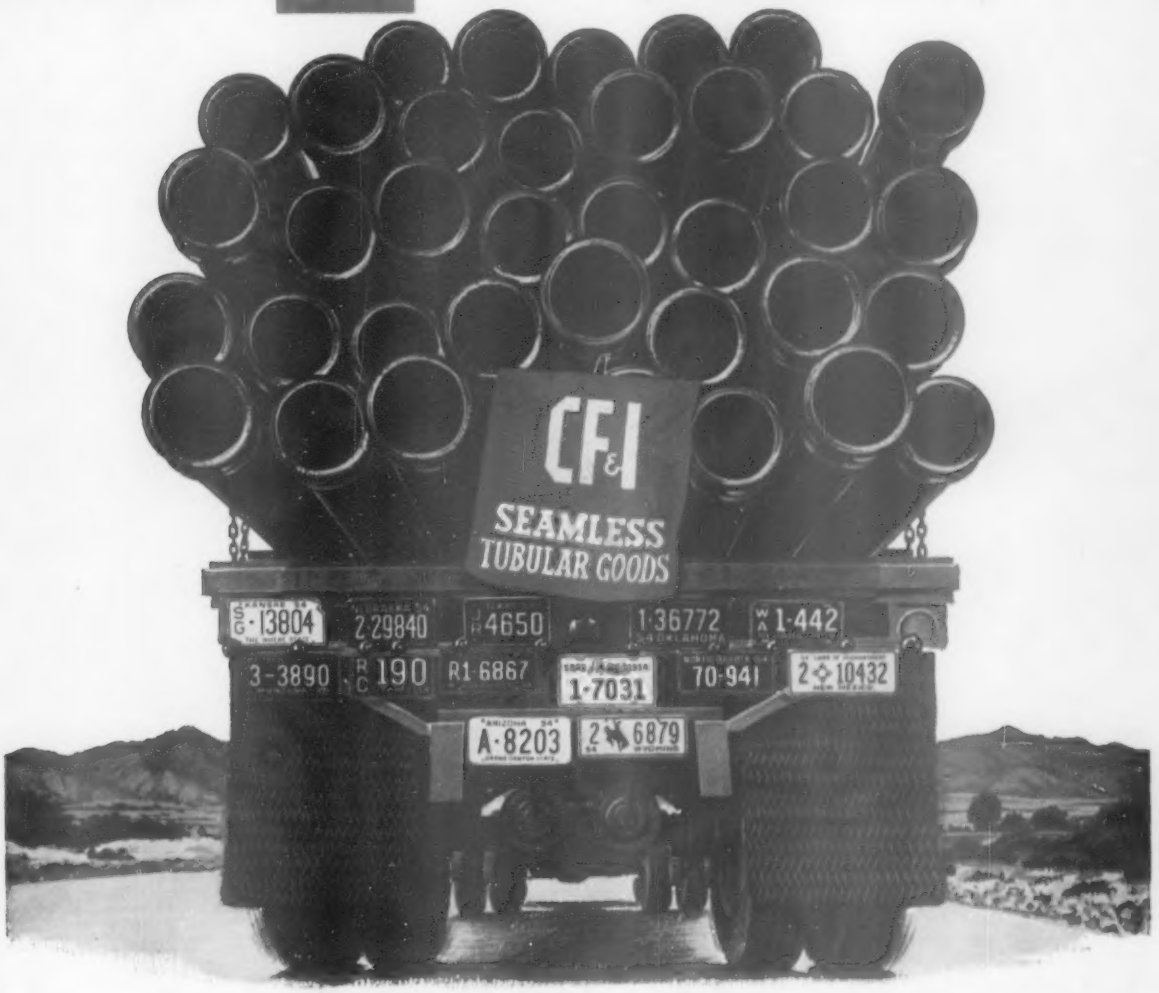
Weighing only 138,000 pounds, this Beaird 70,000 gallon pressure storage tank is one of the largest in the industry. 130" in diameter and 107' 3" in length.

Over two hundred million gallons experience

THE J. B. BEAIRD COMPANY, INC., SHREVEPORT, LOUISIANA

BEAIRD

from the new CF&I SEAMLESS TUBE MILL



headin' for the oil country

Prompt and efficient service for the oil and gas industries of the Rocky Mountain and Southwest areas. That's the need that brought into being the new CF&I Seamless Tube Mill at Pueblo, Colorado—newest mill of its type located West of the Mississippi.

Here—centrally located to some of the largest oil and gas producing regions—the most modern facilities and machinery combine with step-by-step quality control to assure seamless casing and tubing that for precision and quality are unrivaled in the industry.

CF&I Seamless Oil Country Casing and Tubing meet API STD 5A specification—in sizes from 2⅜" O.D. through 9⅝" O.D.

CF&I TUBULAR PRODUCTS
THE COLORADO FUEL AND IRON CORPORATION CF&I
DENVER, COLORADO

2519

"It's engineered to get the job done right"

The picture above shows what G. L. Fife, Jr., of G. L. Fife & Son, Natchez, Miss., means when he talks about getting a job "done right." Here, one of their Mack trucks, a six-wheel Model LMSW is moving a draw-works, compound and two motors, a combined weight of approximately 80,000 pounds.

A user of Mack trucks for the past nine years, Mr. Fife says, "I like the way our Mack LMSW eases the iron up a ramp with power to spare. Then when it gets out on the highway it operates at legal road speeds without burning up the rear end gears. It's easy to maneuver and it's dependable. In short, it's engineered to get the job done right."

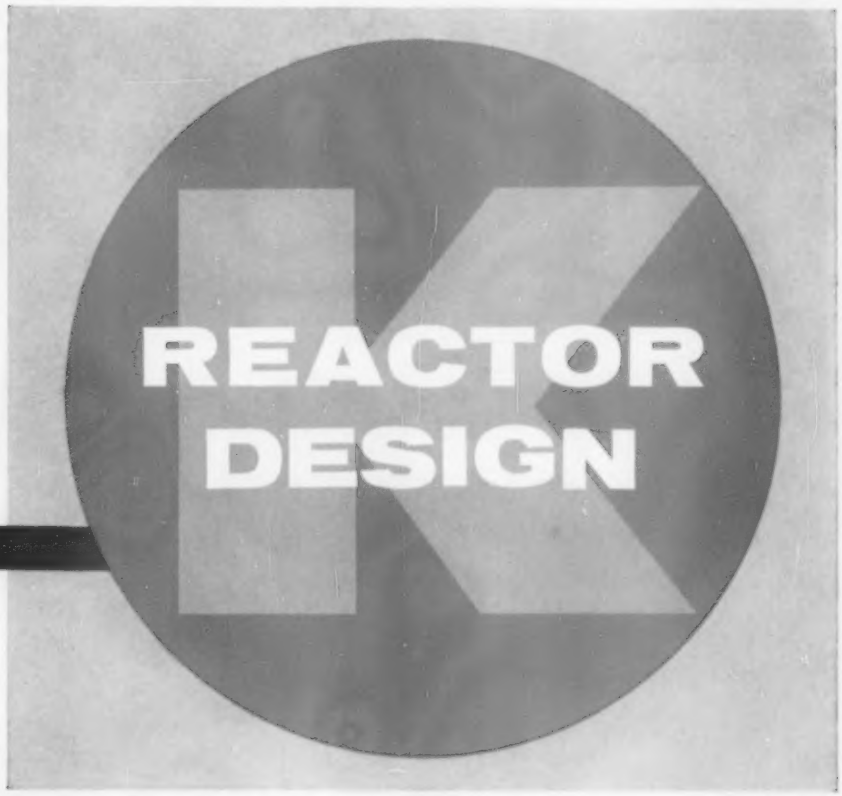
Bigger drilling rigs and bigger oil field equipment are making extra demands on trucks these days. Trucking contractors in the oil fields, like G. L. Fife & Son, are proving the truth of the oft-repeated fact—Wherever You See Tough Jobs—There You'll See Macks.

They find that to get the job done right, they can't afford *not* to own Macks.

MACK TRUCKS, Empire State Building, New York 1, N. Y.

3000

FOR INCREASED AMMONIA DEMANDS



KEY TO HIGHER YIELDS—LOWER COSTS

IN THE PRODUCTION of ammonia, The M.W. Kellogg Company offers a number of processes for the generation and purification of synthesis gas—depending on the starting material and other local economic conditions. For the conversion phase, however, it is the Kellogg-developed, quench-type reactor which can contribute the most to increased plant capacity.

Assuring extremely accurate and flexible control of the temperature inside the catalyst mass, the Kellogg reactor eliminates the "hot spots" which cannot be averted with the conventional catalytic basket equipped with tubular heat exchangers. This in turn means, for any production rate, the gradient of temperature which gives the highest possible yields of ammonia per pass.

Capacities per day in excess of 300 tons per unit are now entirely practical with the Kellogg reactor. One such plant now being built by The M. W. Kellogg Company will have the unusually low investment cost of about fifty dollars per ton of annual capacity.

Your inquiries on ammonia or other proposed petrochemical projects are cordially invited.

KELLOGG

PETROCHEMICAL PROCESSES AND PLANTS

CHEMICAL PROCESS DIVISION

THE M. W. KELLOGG COMPANY, 225 BROADWAY, NEW YORK 7, N. Y.

The Canadian Kellogg Company, Limited, Toronto • Kellogg International Corporation, London

SUBSIDIARIES OF PULLMAN INCORPORATED

HOW A DRILLER

HITS THE Jack Pot!

SpringKore rotary drilling line, Blue Ribbon steel in drill pipe and J&L quality in all tubular goods, Ideco rotary equipment, PlastiKore wire rope for cable tool drilling . . . these are major examples of mature judgment in distribution resulting from almost 50 years of close cooperation with drillers.

But another important J&L contribution to efficient drilling is the consistently critical selection of items the driller has little time to investigate . . . such readily expendable but, in the aggregate, expensive items as catlines, rotary, vibrator and suction hose, V-belts, and pump and swivel packings.

We see to it with every faculty and resource at our command that a driller who does business with J&L hits the equipment jack pot!

J&L STEEL

"...here's MY warehouse!"

Jones & Laughlin STEEL CORPORATION

SUPPLY DIVISION – TULSA, OKLAHOMA

Serving The United States and Canada

PESA

PARTNERS IN PETROLEUM PROGRESS

From Key Station on down the line- Powered with Utility Electric Power! The biggest assets of Electric Power are dependability, efficiency and lower operating costs, utilizing remote automatic controls. Utility Electric Power also gives you smooth, uninterrupted performance — that's tailored for the individual job. It's also flexible enough to meet unforeseen requirements. Big or small — Utility Electric Power — fits them all!

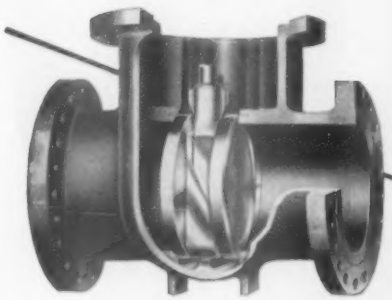
CALL YOUR NEAREST ELECTRIC SERVICE COMPANY FOR POWER FACTS

Petroleum Electric Power Association

P. O. BOX 2771, DALLAS, TEXAS

ORGANIZED IN THE INTEREST OF GREATER SERVICE TO THE PETROLEUM INDUSTRY

LOOK INSIDE



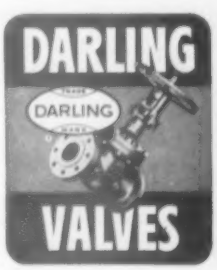
for dollars to be saved!

Darling 24", Series 300, motor-operated gate valve, with fully revolving double disc feature, at pipe line terminal of oil pumping station.

SURE! Other things being equal, it's definitely the inside of a gate valve that really tells the story. That's why we show and stress the importance to you of Darling's *fully revolving double disc, parallel seat principle!*

Simple construction, interchangeable no-pocket discs . . . yes . . . but that's only the start. This principle assures uniform distribution of disc-and-seat wear . . . coupled with Darling's unique wedging feature it once and for all licks the problem of faulty closure due to valve body distortion . . . and greatly eases operation even under the most adverse conditions.

That's why oil and gas men everywhere have come to count on Darling gate valves for surer performance, longer life and less down time. It pays. We'll gladly give you *all* the facts on Darling valves for your particular operations. Just ask.



DARLING VALVE & MANUFACTURING CO.
Williamsport 1, Pa.

Manufactured in Canada by Sandilands Valve Manufacturing Co., Ltd., Galt 19, Ont.

MEASURING UP

EVERY LENGTH of Basalt-Kaiser Steel line pipe measures up to the rigid specifications of the nation's pipe line companies.

This is possible because every step in pipe making, from raw materials mining to finished fabrication, is controlled by us, assuring pipe of highest quality.

During production, Basalt-Kaiser Steel pipe must measure up to 52 rigid tests to make certain it fulfills your requirements for on-the-job workability and durability.

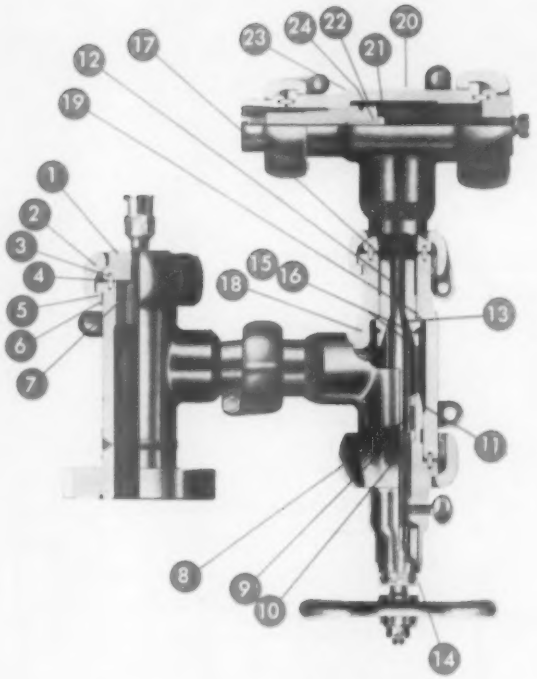
Add to this Kaiser Steel's *prompt service* and *wide range of sizes* and it's clear why pipe men rely on . . .

Kaiser Steel

KAISER STEEL PIPE SPECIFICATIONS • All pipe manufactured to latest A.S.T.M. and A.P.I. specifications

Type	Diameter	Length	Wall Thickness	Shipping Point
Continuous Weld—Threaded and Coupled	½" to 4" nominal I.D.	Uniform 21'	Standard	Fontana, Calif.
Continuous Weld—Plain End	2⅜" to 4½" O.D.	Up to 40'	Standard	Fontana, Calif.
Electric Resistance and Fusion Weld—Plain End	14" to 18" O.D.	Up to 40'	.250" to .500"	Napa, Calif.—Basalt-Kaiser
Electric Resistance Weld—Plain End	5⅝" to 12¾" O.D.	Up to 55'	.188" to .375"	Fontana, Calif.
Electric Fusion Weld—Expanded—Plain End	20" to 30" O.D.	Up to 40'	.250" to .500"	Napa, Calif.—Basalt-Kaiser

Prompt, dependable delivery at competitive prices • **KAISER STEEL CORPORATION** Los Angeles, Oakland, Seattle, Portland, Denver, Tulsa, New York



Are you getting all of these important features for your flow manifold dollars?

These are the "Extras" that make UNIBOLT the best buy of all manifolds

1	Tee cannot be accidentally opened.	13	Wing Valve requires no grease to effect a seal . . . may also be used as micrometer-gauged flow bean.
2	No exposed threads . . . no accidental damage.	14	Variable choke speeds up initial clean-up or running initial flow tests . . . saves rig time.
3	Concealed seat in groove . . . no accidental damage.	15	Cyanide hardened stem and stem seat . . . resists corrosion.
4	All metal seat . . . not affected by high or low temperature.	16	Choice of hard chrome plated or "SA" stainless stems and seats.
5	Lubricators, bottom hole pressure adapters, and valves easily attached to Unibolt connection.	17	Unrestricted 1" opening in Wing Valve will pass 10,000 bbls. of fluid per day with 100 lbs. pressure drop.
6	2"—3000 lb. wp Unibolt 28% stronger than 2" — ser. 900 flange.	18	Wing Valve can be completely overhauled without removal from tree.
7	Unibolt stronger than tubing threads . . . ideal for working trees with welded lift nipple. Tubing threads in tee if desired.	19	Wing Valve stem seat sealed by power threads and metal gasket assures alignment.
8	Stem packing needs no tightening.	20	Positive Choke Body takes regular or "X" Beans . . . all beans flow-rated.
9	Stem turns freely under high pressures.	21	Shaped entrance on beans prevents paraffin clogging.
10	Threads on stem not exposed to external or internal damage.	22	Positive Choke Body may be replaced with inexpensive tee and cage nipple.
11	Full 2½" pilot for true stem alignment and rigidity.	23	Positive Choke Body can be converted to Adjustable Wing Valve by substituting two parts.
12	Streamlined flow — no obstructions . . . no turbulence.	24	Beans and stem seats have external hex for wrenching.

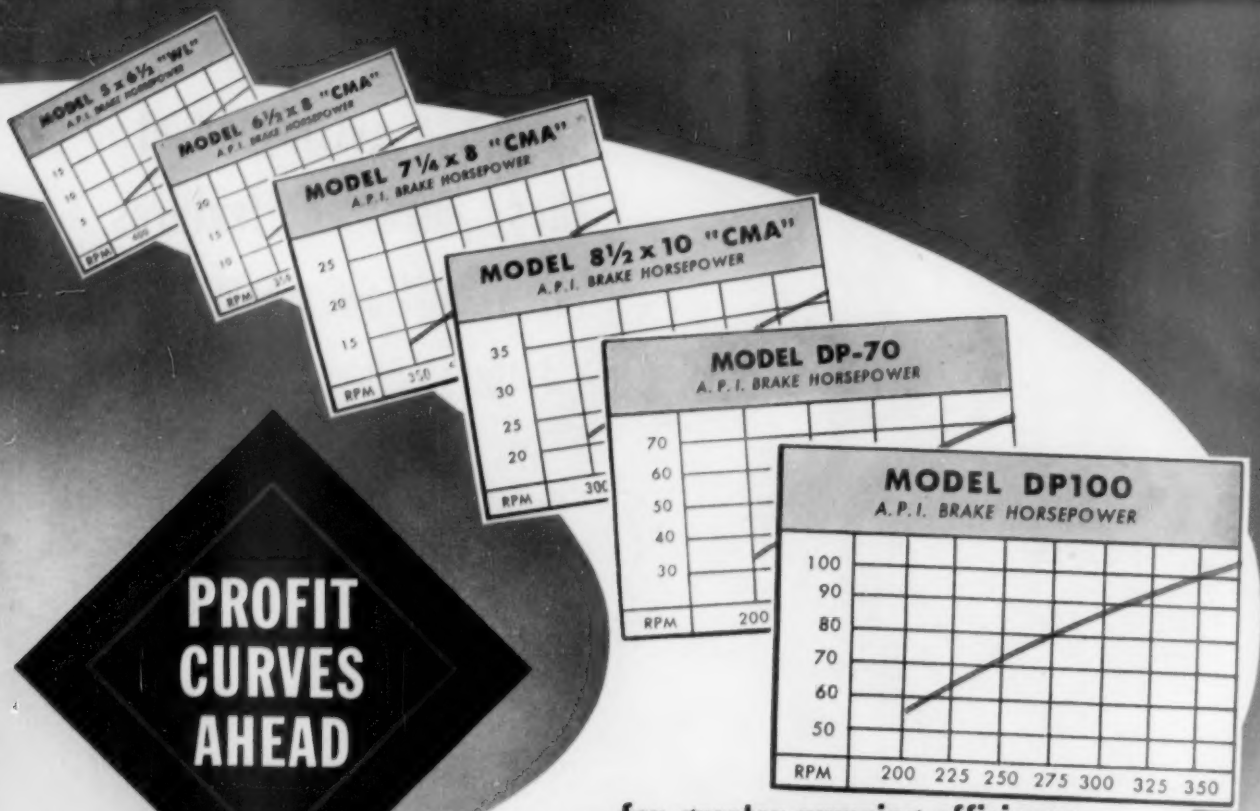
UNIBOLT

FLOW MANIFOLD

Eliminates impingement of flow and negative pressure areas. It may be salvaged completely or as separate units. The three separate units provide flexibility in arrangement of connections. All parts easily replaced in the field . . . all parts interchangeable. Check the accompanying list of other distinctive features. UNIBOLT offers far more safety, flexibility, efficiency, and all-round quality for your flow manifold dollars.

THORNHILL CRAVER CO.

P. O. BOX 1184
HOUSTON, TEXAS



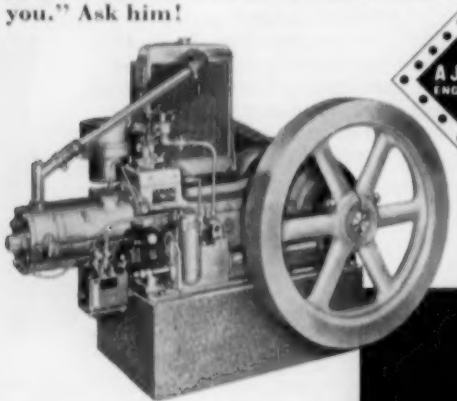
PROFIT CURVES AHEAD

—for greater pumping efficiency at lower pumping costs!

Ajax

GAS AND OIL ENGINES

The horsepower curve of each engine in the complete AJAX line tells its own action story to the experienced oil man! Engine for engine, size for size, it's AJAX for top power and economy. Your Supply Man will be glad to produce "the curves that make money for you." Ask him!



The complete line —

5 to 105

A. P. I. HORSEPOWER

AJAX IRON WORKS

Builders of GAS AND OIL ENGINES, PRESSURE PUMPS, STEAM DRILLING ENGINES, INDUSTRIAL STEAM ENGINES

CORRY, PENNSYLVANIA

Oil Field Distributors: THE NATIONAL SUPPLY CO., PITTSBURGH, PA.
R. B. MOORE SUPPLY CO., BOLIVAR, N.Y. • BETHLEHEM SUPPLY CO., TULSA, OKLAHOMA

PIPE LINE PROGRESS

26-inch A. O. Smith line pipe on location during Interprovincial's 1954 looping program.

Interprovincial's third looping project uses 386 miles of A. O. Smith line pipe

A. O. Smith supplied 386 miles of pipe to Interprovincial Pipe Line Company for its 1954 looping program. This total includes 190 miles of 24 inch pipe and 196 miles of 26 inch pipe. Our shipments, each on schedule, started in May and the loop was completed in October.

On the job from the start, A. O. Smith has served Interprovincial in three key phases of line construction. We supplied all the 20-in. and 18-in. pipe used in the company's original line from Edmonton, Alberta, to Superior, Wisconsin. The 20-in. main links Edmonton and Regina . . . while the 18-in. line completes the run from Gretna, Manitoba, to Superior. Total here was 864 miles of line pipe.

The second looping project brought another call for A. O. Smith line pipe — 135 miles of 24-in. pipe to loop the Saskatchewan and Manitoba sections in the system.

A. O. Smith is proud to have participated in the building of this great transcontinental system — the world's longest crude line — now transmitting western Canadian crudes all the way from Edmonton to Sarnia, Ontario. This participation demonstrates our ability to meet delivery schedules anywhere on the continent. Both our Milwaukee and Houston mills served to supply Interprovincial with high quality, internally expanded, welded line pipe.

A. O. Smith line pipe is available in a complete range of sizes and wall thicknesses, from 8 ⅝-in. to 36-in. diameters.

Through research . . . a better way

A.O.Smith

CORPORATION

TUBULAR PRODUCTS DIVISION

Milwaukee 1, Wisconsin

Chicago 4 • Dallas 2 • Houston 2 • Los Angeles 22
Midland 5, Texas • New Orleans 12 • New York 17 • Pittsburgh 19
San Francisco 4 • Seattle 1 • Tulsa 3 • Washington 6, D. C.
International Division: Milwaukee 1, Wisconsin

LUFKIN

2 CYLINDER—2 CYCLE HORIZONTAL GAS ENGINES . . .

2 ENGINES IN 1

Two CYLINDERS

- FOR SMOOTHER OPERATION
  Two power strokes per revolution reduces shock and vibration.
- FOR LOWER STARTING TORQUE
  Requires less power for starting.
- FOR GREATER OPERATING SPEED RANGE.

COMBINES THE ADVANTAGES OF SLOW SPEED FOR RUGGEDNESS AND LONG LIFE WITH THE SMOOTHER POWER DELIVERY OF EXTRA CYLINDERS.

Only LUFKIN

MANUFACTURES OILFIELD ENGINES IN THE SOUTHWEST AREA. CONSEQUENTLY OUR CUSTOMERS ARE ASSURED OF RAPID SERVICE AND OVERNIGHT SUPPLY OF PARTS.

Lufkin **FOUNDRY & MACHINE COMPANY**

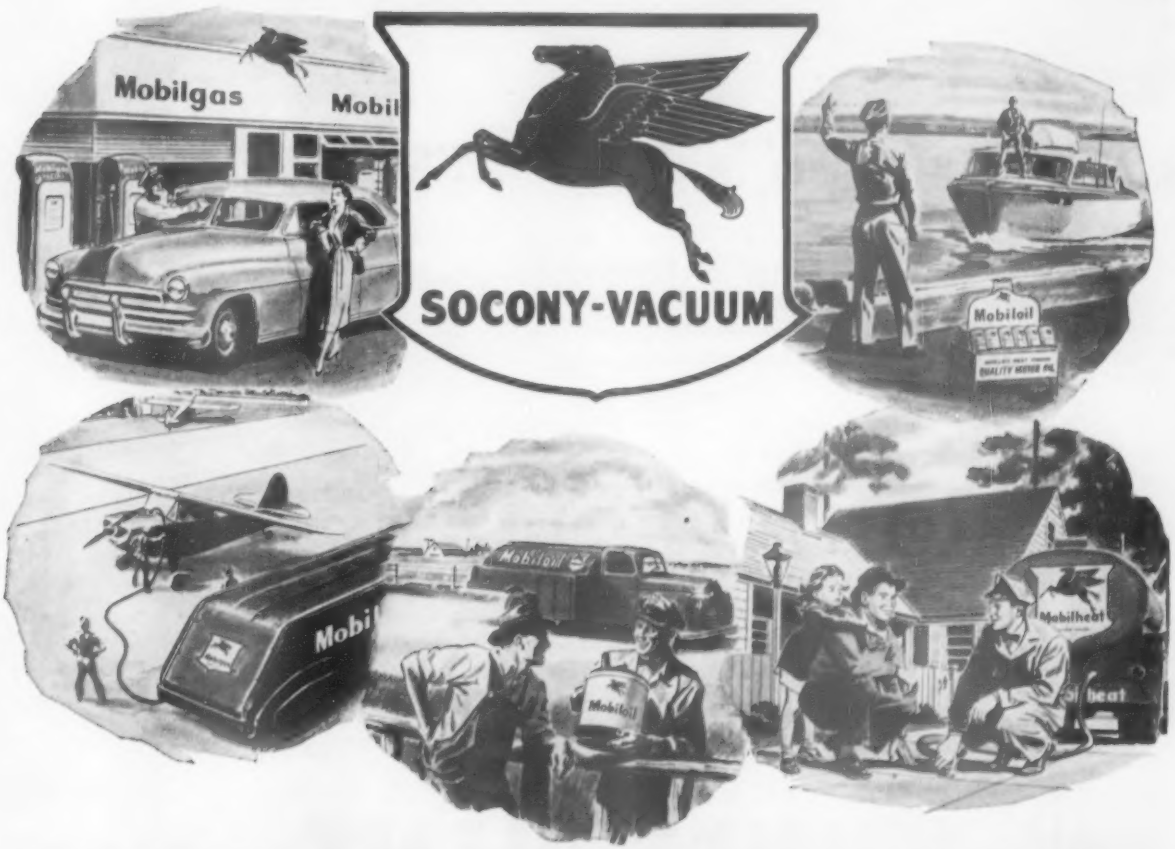
LUFKIN, TEXAS

Branch Sales and Service: Houston • Dallas • New York • Tulsa • Los Angeles • Seminole • Oklahoma City • Corpus Christi • Odessa
Kilgore • Wichita Falls • Casper, Wyoming • Great Bend, Kansas • Effingham, Illinois • Duncan, Oklahoma
Brookhaven, Mississippi • El Dorado, Arkansas

Lufkin equipment in Canada is handled by THE LUFKIN MACHINE CO., LTD., 14321 108th Avenue, EDMONTON, ALBERTA, CANADA

AMERICA'S No.1 WORK HORSE

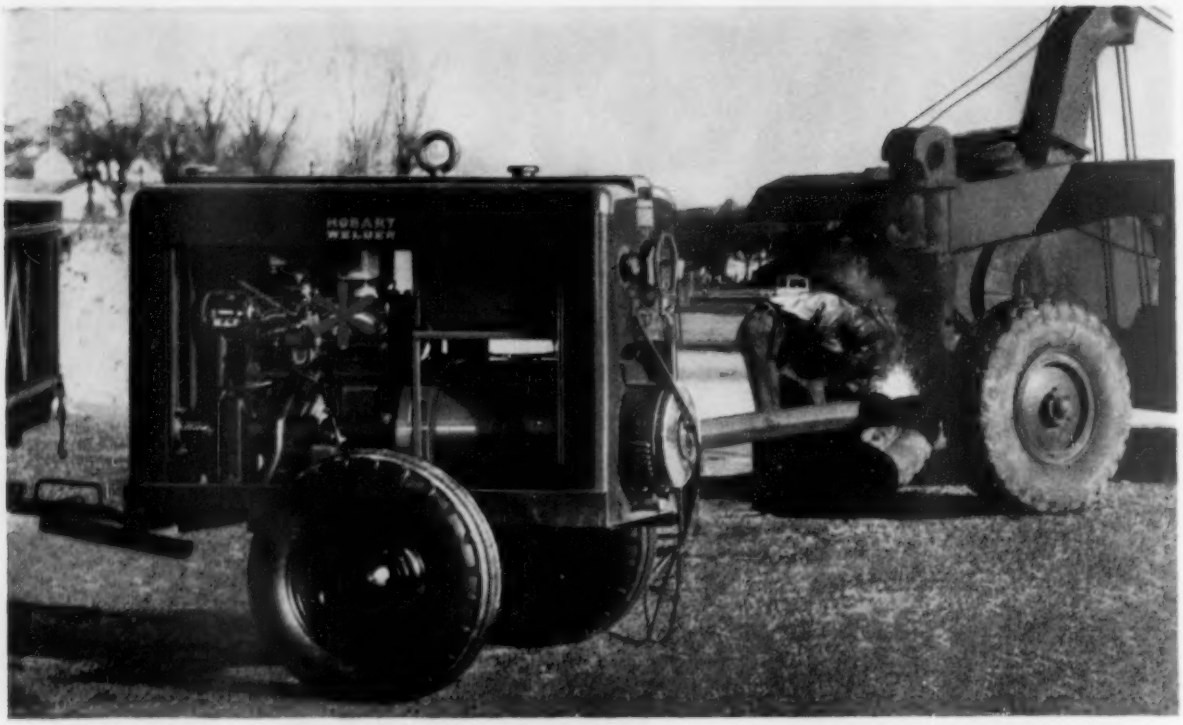
Works Continuously to Bring Better Products to Everyone – Everywhere!



SOCONY-VACUUM OIL COMPANY, INC.

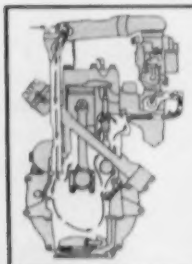
and Affiliates:

MAGNOLIA PETROLEUM COMPANY • GENERAL PETROLEUM CORPORATION



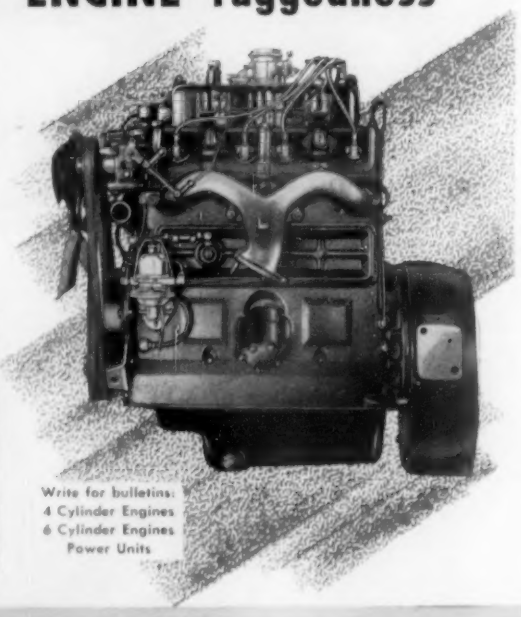
*Hobart Welder with JEEP ENGINE ruggedness

From the proven design of the perfected "Jeep" Engine has come four tough, 4 and 6 cylinder POWER GIANT Industrial Engines. Here's new low Engine maintenance . . . new high Engine dependability . . . whether installed directly into your equipment or employed in the Willys Power Unit. For technical information on Willys rugged designs and their "proven-in-action" features, write today.



POSITIVE
crankcase ventilation

Willys positive ventilation is **automatically regulated to engine speed.** Filtered air forces removal of oil-thining or acid-forming condensates. It is one of many Willys "proven-in-action" features for rugged power uses.



Write for bulletins:
4 Cylinder Engines
6 Cylinder Engines
Power Units

Willys **POWER GIANT** Industrial Engines and Power Units

PROVEN IN ACTION

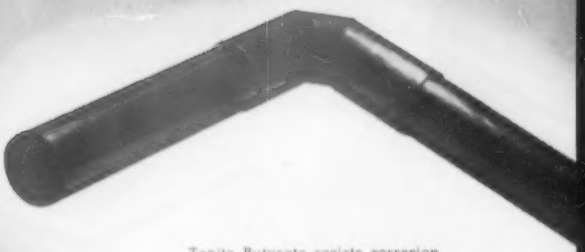
WILLYS MOTORS, INC. • *Industrial Engine Department*

1475 NORTH COVE BLVD. TOLEDO, OHIO

Butyrate pipe cuts installation time

Tenite Butyrate's light weight and easy joining by solvent welding can cut labor installation costs by more than 60%.

Butyrate pipe cuts corrosion failures



Tenite Butyrate resists corrosion by sour crudes, brine and electrolytic soils. This Tenite section from a salt water disposal line is still in good condition after 2 years' service. On the same line, metal pipe used to fail completely in 6 months.

Butyrate pipe cuts paraffin clogging

How much time do you lose in cleaning out paraffin-clogged metal lines? The clean, smooth inner wall of a Tenite pipe offers no toe-holds for paraffin.

Could Tenite Butyrate cut costs for you?

SAVINGS BEGIN the minute you order Tenite Butyrate pipe. Its light weight saves freight, handling and distribution costs. Simple solvent welding with slip-sleeve couplings makes it fast to install. You have no expensive corrosion failure replacements, no periodic cleaning out of accumulated paraffin.

This lightweight pipe is only 1/12th the weight of cement-lined metal pipe. It has good impact resistance and performs well over a wide temperature range.

The petroleum industry has long sought a lightweight, corrosion-resisting pipe that would be strong enough to take the abuse of oil field use. Tenite Butyrate gives you this combination. Years of successful service in all types of fields prove its complete suitability for crude, corrosive water and brine lines. Mail the coupon for more information plus a list of Tenite pipe suppliers. EASTMAN CHEMICAL PRODUCTS, INC., Kingsport, Tennessee, subsidiary of Eastman Kodak Company.

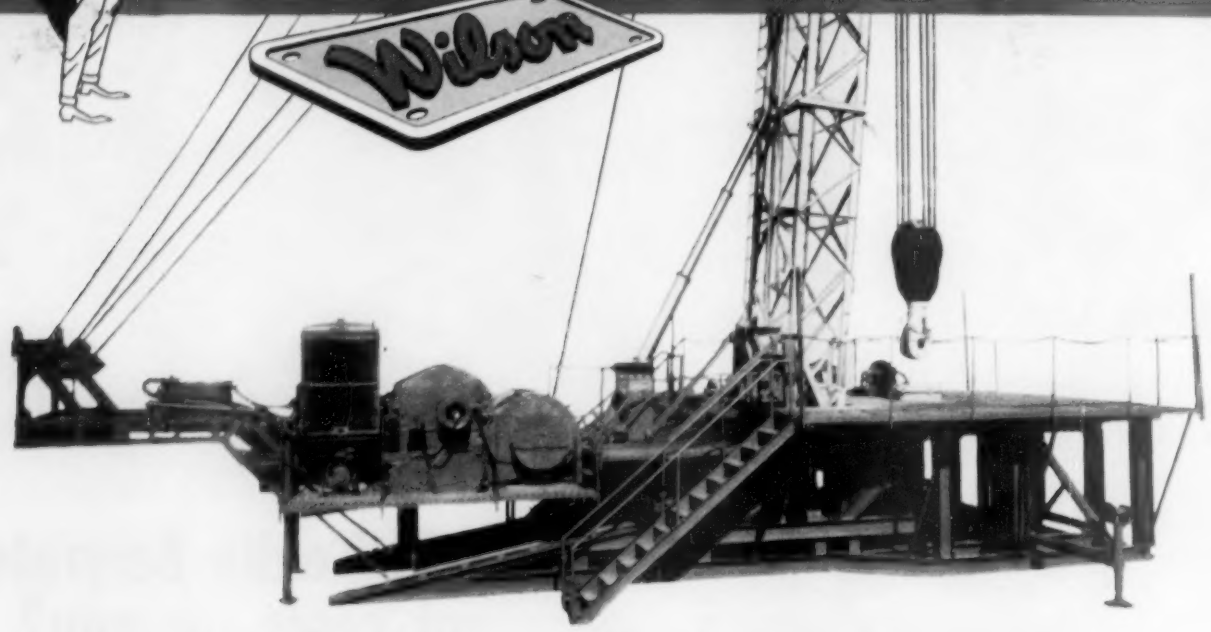
TENITE
BUTYRATE
an Eastman plastic

EASTMAN CHEMICAL PRODUCTS, INC.
KINGSPORT, TENNESSEE

Please send me information on TENITE BUTYRATE PIPE and a list of companies manufacturing Tenite pipe and fittings.

NAME .....
POSITION .....
COMPANY .....
STREET .....
CITY ..... STATE .....
OG-3-55

SMOOTH SERVICING
ON DEEP WELLS
MOGUL *Torcair* 42 Single or Double Drum Winch



CAPACITY: SERVICING WELLS TO 10,000 FEET With 2½-Inch Tubing, Without Hydromatic Brake — **SERVICING WELLS TO 16,000 FEET** With 2½-Inch Tubing, With 15" Double Rotor Hydromatic Brake . . . **AND NOTE THESE: • FULL AIR CONTROLS • FULL OIL BATH CHAIN DRIVES • LOWER DRUM BRAKE RINGS 42" x 8½" • WILSON QUALITY THROUGHOUT • TORQUE CONVERTER APPLICATION —**

Either a Torcon Torque Converter, Twin Disc or GM Converter can be used with any single engine Torcair Rig or Winch.

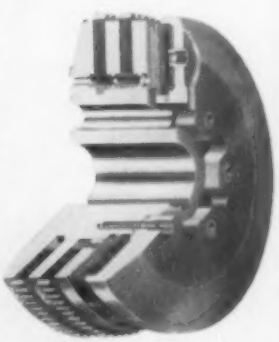
Complete Portability! Under 8 Feet in width!

Be Modern - Buy Wilson

ALL DRIVES EQUIPPED WITH

WICHITA AIR-TUBE DISC CLUTCHES

This type of clutch combines all the advantages inherent in air operation, such as convenient remote control, small manual pressure required for full torque, smooth starting and controlled torque. In addition, it gives freedom from self-engagement or reduced capacity, due to centrifugal force; and has much greater torque capacity than radial type air clutches. No packing to leak or let water or oil into the clutch friction surfaces. All air connections are on the outside and easily accessible. This without a doubt the finest clutch yet developed for this type service, providing great capacity in minimum space, no adjustments, practically impossible to burn up. **SMOOTHEST ENGAGEMENT OF ANY AIR CLUTCH!**



HYDROTARDER BRAKE APPLICATION

HYDROTARDER: The Mogul unit can be equipped with the 15" Double Rotor Type Hydromatic Brake driven by a chain drive from the countershaft. This brake can be used with either upper or lower drum, and when used on main drum with five lines strung up will absorb a total of 1300 H.P. when dropping the stands at the rate of 60 feet in 12 seconds. This is the equivalent of 16,000 feet of 2½" tubing. The brake is so arranged that it will absorb very little power when taking up the empty blocks and jaw clutch does not need to be disengaged to take up the empty blocks when the trip is completed.

The FIRST NAME in OIL FIELD WINCHES

WILSON MANUFACTURING CO., Inc.

The HOME of RED IRON • Wichita Falls, Texas

Corrosion Resistant and High Tensile

Oil Well Tubing

NOW AVAILABLE FROM HOUSTON STOCK

High Tensile Oil Well Tubing
105,000 lbs. minimum yield
Integral Joint

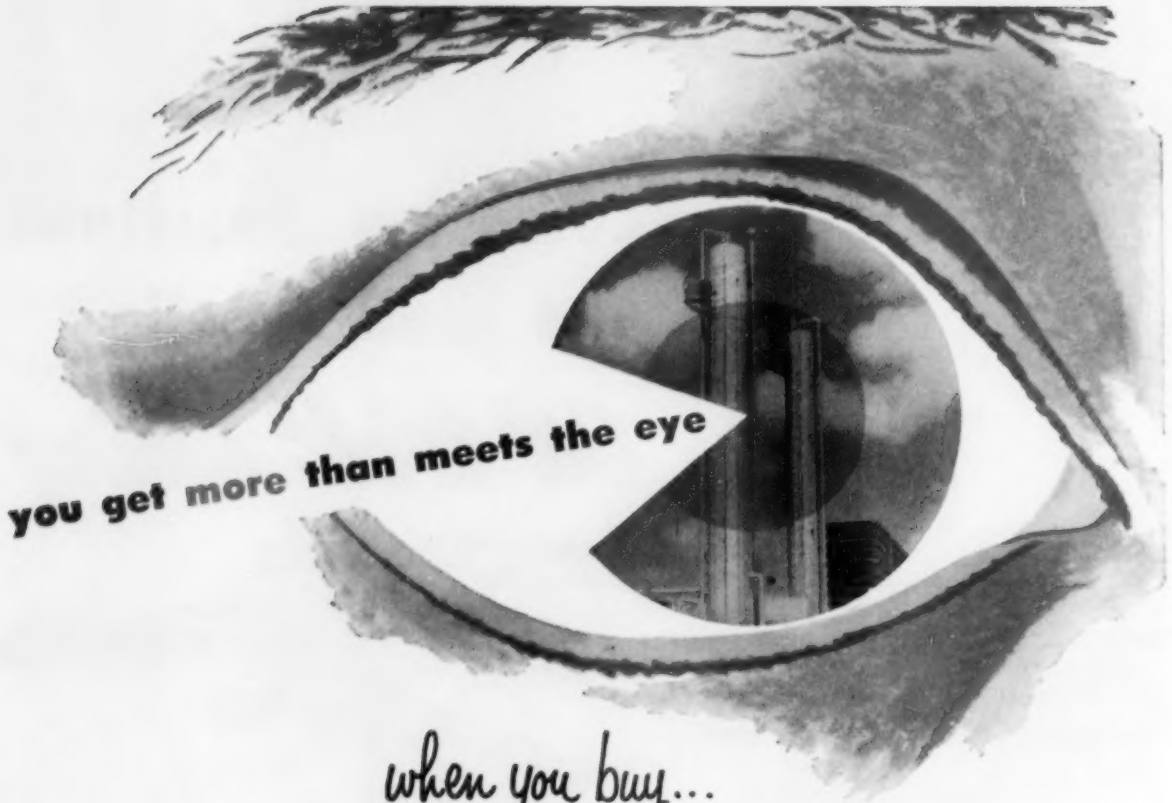
Corrosion Resistant Alloy Oil Well Tubing
9% Chrome ½% Moly
100,000 lbs. minimum yield
Integral Joint

Sizes 2⅜" x 4.70 lbs. per foot
2⅞" x 6.50 lbs. per foot
2⅞" x 7.64 lbs. per foot

Immediate shipment of 14,000 ft. strings
Tested to 80% of minimum yield

TEX-TUBE INC.

1504 OLIVER ST.
CH-6411
HOUSTON 7, TEXAS



when you buy...

MONOETHANOLAMINE
DIETHANOLAMINE
DIETHYLENE GLYCOL
TRIETHYLENE GLYCOL

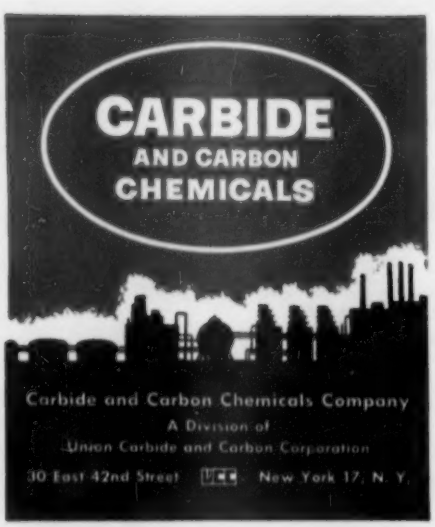
from **CARBIDE**

Yes! You get *more* than drums and tank cars of the best gas-treating chemicals . . .

YOU GET . . .

- the results of CARBIDE's 20 years' experience in their manufacture.
- the service of CARBIDE's field representatives.
- the assistance of CARBIDE's laboratories where specialists devote a great amount of time to work on customer service problems.
- the benefit of CARBIDE's knowledge about the handling, properties, and use of these chemicals.
- the assurance of availability and fast service through CARBIDE's national distribution network of 50 warehouses. (In Canada: Harrisons & Crosfield's.) Shipments are made in tank cars, tank wagons, and drums in carload or truckload lots.

REMEMBER: You get **more** *than chemicals when you do business with CARBIDE.*



Texas Eastern "counts" the B.t.u.'s

To establish conclusively the value of natural gas distributed, this great transmission line uses Cutler-Hammer Calorimeters

C-H B.t.u. Control Equipment used on this system

Texas Eastern uses Cutler-Hammer Calorimeters at gathering and distribution points to measure the B.t.u. content of the gas gathered and sold.

Utilities served by Texas Eastern use C-H Calorimeters, Calorimixers and Jet-type mixing equipment to check, mix and stabilize the heating value of the gas distributed. Typical C-H installations are found in

East Ohio Gas Co.
Peoples Natural Gas Co.
New York State Natural Gas Corp.
Ohio Fuel Gas Co.
Carnegie Natural Gas Co.
United Natural Gas Co.
Philadelphia Electric Co.
Public Service & Gas Co.
New York & Richmond Gas Co.

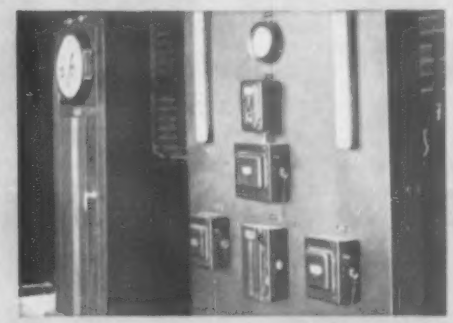
and many other municipalities along the way.

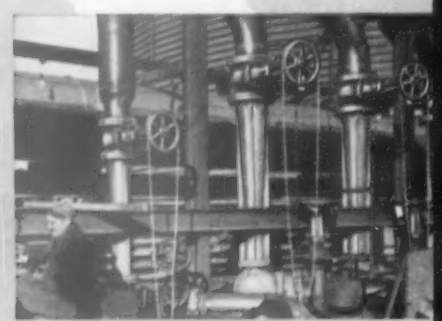
Texas Eastern Transmission Corporation is big, modern, progressive—as witness the purchase of the Big and Little Big Inch lines, the reconditioning of these lines, the construction of 791 miles of new 30" line, the acquisition of the Oakford Storage Field in Pennsylvania, the projected daily capacity of 1.2 billion cubic feet of natural gas to serve communities all the way from St. Louis to Boston. Vast as this operation is, it is based on the simple, single fact of gas passing through its lines. Texas Eastern accurately counts the dollars and cents of its annual revenue of around $100,000,000.00. This revenue is derived from the sale of B.t.u.'s. These B.t.u.'s therefore must be "counted" accurately, since a one percent error might mean a loss of one million dollars annually.

So the Texas Eastern Transmission Corporation uses Cutler-Hammer Calorimeters at key points in its system to "count" the B.t.u.'s. Cutler-Hammer Calorimeters establish *accurately* and *conclusively* the B.t.u. "count" per standard cubic foot of gas . . . *and are the only instruments so rendering this accurate "count."*

Municipal Utilities and Industrials served by Natural Gas Lines use Cutler-Hammer Calorimeters to check, and Cutler-Hammer Gas Mixing Equipment to stabilize the heating value of gas distributed.

Because the markets and the franchises of municipal utilities depend on delivering to the consumer a stable, dependable product, these utilities use both Cutler-Hammer Calorimeters and Gas Mixing Equipment. Cutler-Hammer Calorimixers for high pressure or low pressure gas, and Jet-type mixing equipment automatically bring and hold the mixed gas to a stable, unvarying figure by a process involving B.t.u. measuring and flow control. Both metering and mixing equipment are available for any type of plant and any volume of flow. CUTLER-HAMMER, Inc., 1453 St. Paul Avenue, Milwaukee 1, Wisconsin.





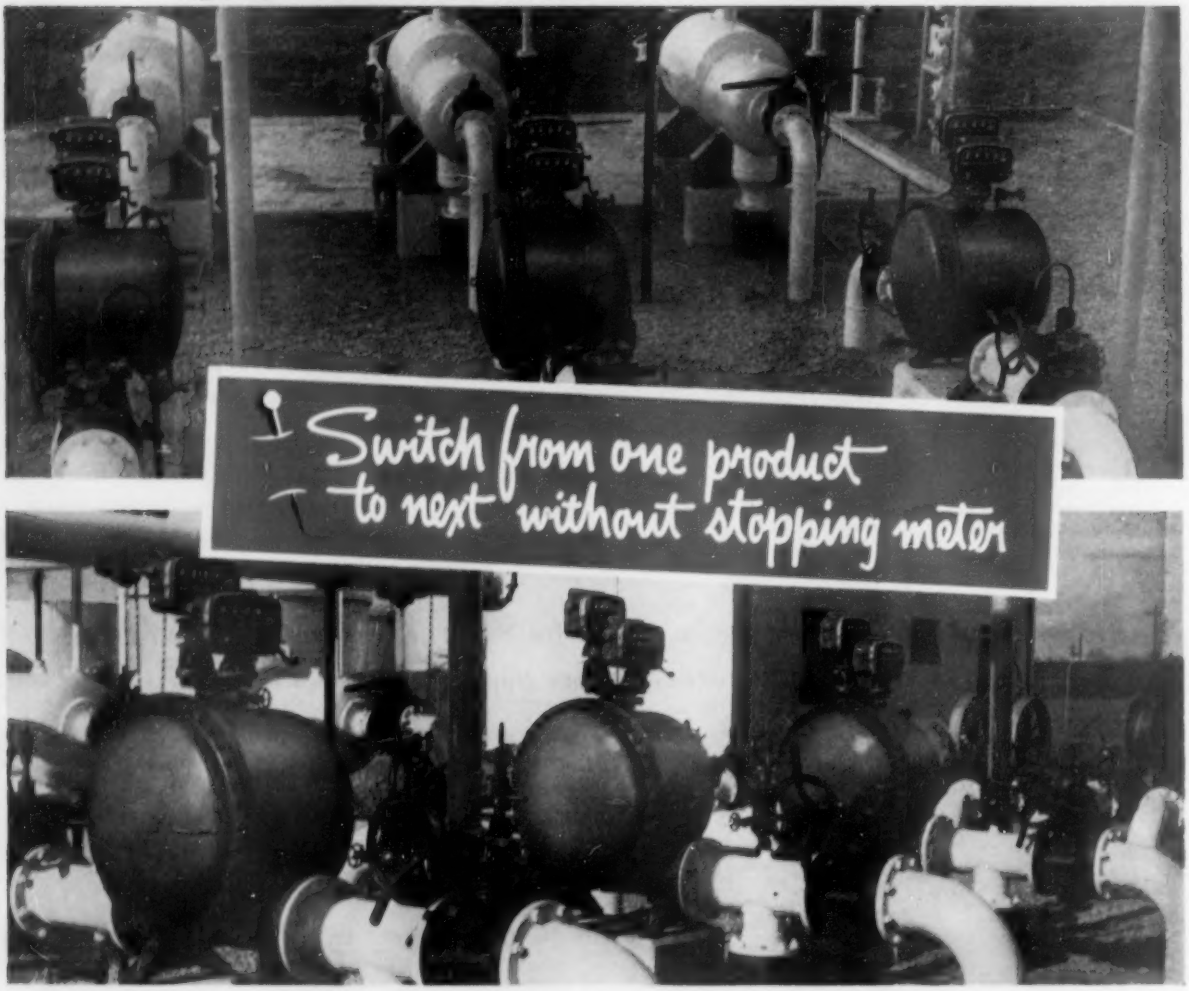
C-H Calorimeters *(at left)* measure accurately and uncompromisingly the B.t.u. content of each standard unit volume of gas distributed regardless of temperature, pressure or flow variables, and write a continuous, available record.

C-H Calorimixers *(in center)* automatically mix two or more high or low pressure gases of variable heating value in any volume, holding the final product undeviatingly to a stipulated figure.

CUTLER-HAMMER
B.t.u CONTROL
C-H

C-H Jet type mixers *(at right)* automatically mix gases of variable heating value to a final low pressure stabilized value. When mixing directly into gas mains as well as into holders, they automatically adjust production to widely varying demands.

RECORD each run of product separately and accurately—with BRODIE *BiRotor* METERS



- Brodie BiRotor Pipeline Meters handle a continuous and successive flow of products through a single meter, recording each run of product separately and accurately.
- Quick, easy switch-over from one product to the next is accomplished without stopping meter, by means of dual counter arrangement.
- Positive direct reading totals are recorded on meter printed receipts.
- For long dependable service life with high sustained accuracy and low maintenance, consult your Brodie Meter Specialist for full details.

ALL-STEEL

BRODIE BiRotor METERS

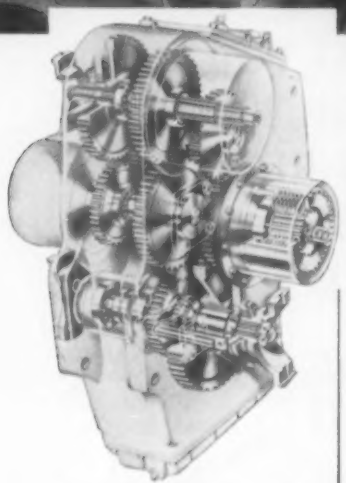
TRUE-ROTARY

RALPH N. BRODIE COMPANY · San Leandro, California, U.S.A.

MT. VERNON, N. Y.	FOREST PARK, ILL.	DALLAS 2, TEXAS	SEATTLE 9, WASH.	LOS ANGELES 22, CALIF.
550 So. Columbus Ave.	1227 Circle Ave.	167 Parkhouse St.	221 9th Ave. N.	5401 E. Sheila Street

REPRESENTATIVES WITH STOCKS AND SERVICE FACILITIES IN ALL PRINCIPAL CITIES

Driver's left hand rests on power-shift levers—there's no clutch pedal



Here's the secret of
BIG TIME-SAVINGS:

the MICHIGAN Power-Shift Transmission! Forward-Reverse and High-Low gears are in constant mesh. Shifting is accomplished by hydraulic pressure. The power-shift levers on the steering column actuate control valves in the transmission. These valves direct oil pressure to the multiple disc-clutches, transmit engine power from the selected drive gears to the output shaft. Hydraulic oil completely lubricates all drive gears and bearings as it flows from top to bottom and returns to the sump through a fine-mesh screen.

You'll cut your loading time!

with the MICHIGAN Power-Shift Transmission

Operating a MICHIGAN Tractor Shovel is both fast and easy. Gone is the old-fashioned heavy duty foot clutch, gone is the tiresome work of clutching every time you shift gears.

The MICHIGAN Power-Shift Transmission does all the work for you. All you do is operate the finger-tip hand levers on the steering column . . . one for Forward-Reverse, the other for High-Low speed. Make either shift *while moving in either direction without coming to a stop.*

The MICHIGAN'S power-shift transmission speeds up operation, cuts loading time, gets you TOP YARDAGE per day.

Get a demonstration right on your own job. It is easily arranged: just phone your MICHIGAN distributor. Did you know MICHIGAN Tractor Shovels are available under the Clark Leasing Plan? We would be glad to send you full details.

CLARK EQUIPMENT

CLARK EQUIPMENT COMPANY
Construction Machinery Division
448 Second St., Benton Harbor 25, Michigan

Wherever You Go...

You'll Find

COMPLETE STOCKS
DEPENDABLE SERVICE
CAPABLE ASSISTANCE
PROMPT DELIVERY

at

SUPPLY BOVAIRD COMPANY

TO GET WHAT YOU WANT
WHERE YOU WANT IT
WHEN YOU NEED IT...
AT REASONABLE
COMPETITIVE PRICES

"Buy From Bovaird"

PESA
PETROLEUM EQUIPMENT SUPPLIERS ASSOCIATION
PARTNERS IN PETROLEUM PROGRESS

THE Bovaird SUPPLY COMPANY
GENERAL OFFICES
TULSA, OKLAHOMA

84 YEARS OF PROGRESS WITH THE OIL INDUSTRY

Sections of this recently completed 462-mile products line of the Oklahoma-Mississippi Products Line, Inc., running through Arkansas from Duncan, Okla., are corrosion-protected by Transhield.

Johns-Manville TRANSHIELD® ASBESTOS PIPE LINE FELT

goes on fast, restricts soil stress, cuts maintenance

Transhield Asbestos Pipe Line Felt meets the need for a felt that is economical yet effective in all ordinary soil conditions.

Designed for easy, high-speed application by modern machine methods, Transhield is strong, light in weight, and highly tear-resistant. Longer length rolls increase application speeds since fewer stops to replace rolls are required. Transhield's highly desirable characteristics are attained through an innovation in felt construction. It consists of a lightweight coal-tar saturated asbestos felt, reinforced with continuous glass yarns parallel-spaced on ¼" centers.

Because Transhield is a continuous membrane between the pipe line enamel and the soil, it works effectively toward preserving a continuous protective film of enamel on the pipe. It guards the enamel during construction and, after installation, it reduces the cold flow of the enamel, acting as a surface barrier to restrict soil stress.

• • •

For further information about Transhield, write to Johns-Manville, Box 60, New York 16, New York; in Canada, 565 Lakeshore Road East, Port Credit, Ontario.

Johns-Manville PRODUCTS FOR PIPE LINE PROTECTION

DOWELL · SCHLUMBERGER
MAGCOBAR · PATTERSON

Four companies agree on one transmitter location . . . one antenna tower . . . AND G-E!

2-WAY MOBILE RADIO

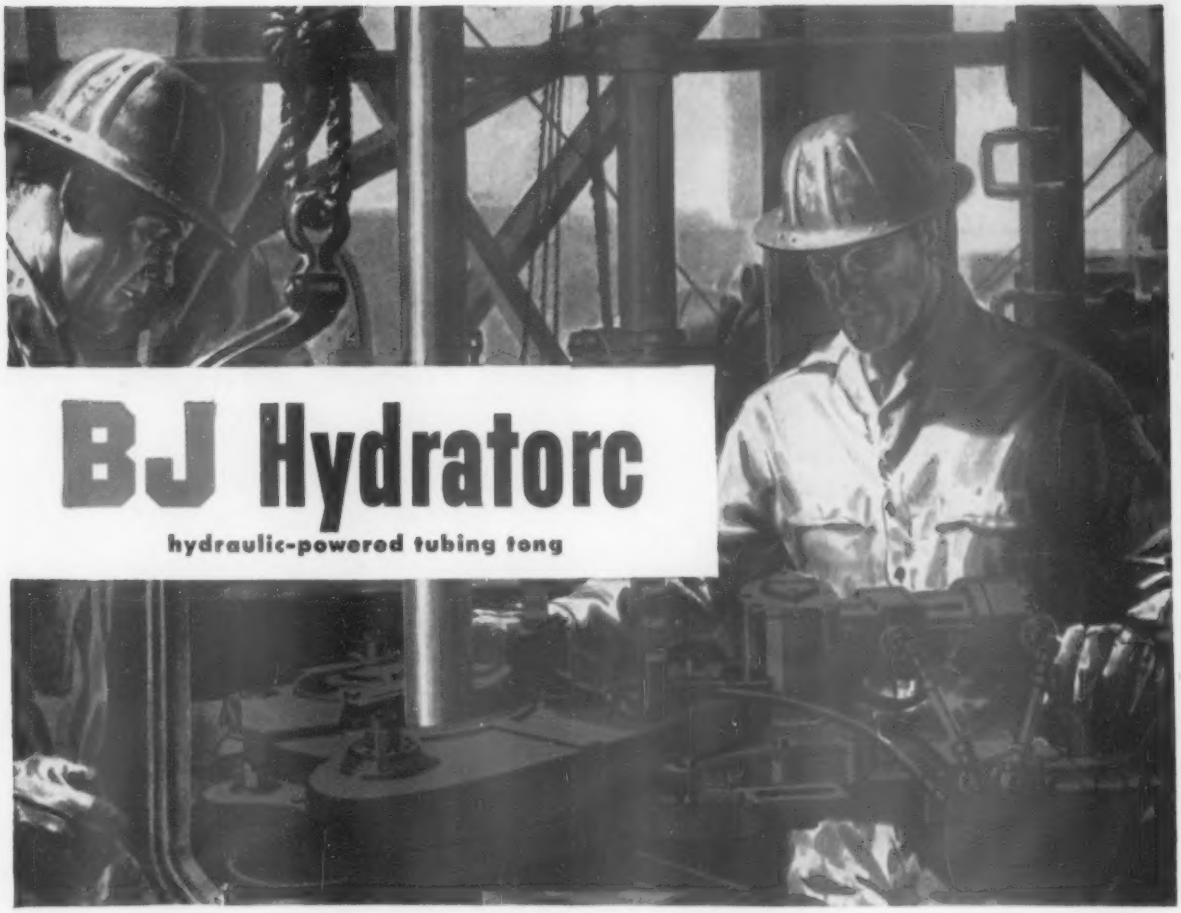
FREQUENCY STABILITY & SELECTIVITY
guaranteed for life!

AT Houma, Louisiana, you'll find one of the most unique mobile radio installations in existence. Four major companies combined their communication interests to effect great economy of operation yet yield high efficiency for all users. *Under one roof,* four separate G-E 250-watt transmitters are housed. Following through with this community plan . . . *one tower* is common support to each of four antennas. In operation more than a year to date . . . no interference problem has yet been reported!

The system described here typifies what you can expect from G-E. Why not call on this expert radio engineering know-how for your communication requirements? *General Electric Company, Section X835-14, Electronics Park, Syracuse, New York.*

Progress Is Our Most Important Product

GENERAL ELECTRIC



BJ Hydratorc

hydraulic-powered tubing tong

More torque, more horsepower, more speed for tubing, workover and slim hole drilling

Byron Jackson – the pacemaker in power tools – puts *more* power to work for you in the new BJ Hydratorc Tubing Tong.

GREATER TORQUE: Provides up to 1650 ft-lbs. of torque in high speed and up to 6300 ft-lbs. in low speed. Maintains more constant torque over entire speed range.

MORE HORSEPOWER: Able to deliver 12 HP *continuously* if required. Operates at 75 to 100 RPM in high speed.

HEAVY DUTY TRANSMISSION: This "beefed-up" transmission is built to handle the extra horsepower and greater torque output of Hydratorc's hydraulic motor... without overloading or strain.

CHOICE OF POWER SOURCE: The BJ Hydratorc can usually be operated off the regular hydraulic system provided to raise mast-type rigs... or can be supplied with auxiliary trailer-mounted hydraulic power source if desired.

WIDE WORK RANGE: Quickly interchangeable jaws and bushings handle all standard tubing sizes as well as special tool joints and couplings. Special clamp allows sucker rod stripping work.

Ask your nearby BJ Sales Office for details or write:

Right for rubber, too!

Say "BJ" for all your oil field rubber product needs... drill pipe, tubing and sucker rod protectors, pipe wipers and wire line guides.

BJ

Byron Jackson Co.

Oil Tool Division *Since 1872*

P.O. Box 2017, Terminal Annex, Los Angeles 54, California

Offices in Houston, Fort Worth, Denver and New York and Sales Engineers in all principal oil fields

Service Directory

STEWART & STEVENSON SERVICE NUMBERS

HOUSTON PLANT WO-9691
Night and Holiday Numbers—
PARTS
I. C. McWhirter MA-6306
R. E. Walker OL-9880
SERVICE
Earl M. Yaw MI-9-8068
G. B. Shandley MI-0702
Fred Mitchell MI-0949
SALES
C. E. Ames LI-9027
E. E. Childress JA-3224
H. A. Trotter WA-4784
Joe Manning MA-8493
IRRIGATION DEPT.
Tom Langham MA-6966
LUBBOCK, TEXAS BRANCH 2-7538
Night and Holiday Numbers
PARTS
Bob Wassom 4-0349
SERVICE
Chris Pratas 2-3664
SALES
Jim Harbin 4-7345
Roe Hornig 4-2542
ODESSA, TEXAS BRANCH 7-4651
Night and Holiday Numbers
PARTS
Jack Ewell 7-7283
SERVICE
R. H. Brough 7-2044
SALES
F. W. Smith (Midland) 2-8824
Joe Rucker 7-0062
Jake Conine 6-9008
CORPUS CHRISTI, TEXAS BRANCH 4-8252
Night and Holiday Numbers
PARTS
J. V. Wolf 52-3666
E. E. Palmer 2-6288
SERVICE
L. L. Bailey 52-4364
E. E. Palmer 2-6288
SALES
N. N. Elkins 52-2878
Harvey Langston 5-9631
R. N. Conolly 3-1386
DALLAS, TEXAS BRANCH FL 7-2855
Night and Holiday Numbers
PARTS
Bill Schmidt ..... FR 7325
Pete Mohler ..... TA 2084
SERVICE
H. V. Mathews (Irving) 7-8577
Milo Weaver (Irving) 7-5311
SALES
L. L. Howell (Richardson) AD 5-7642
Miles McInnis ..... FL 7-2126
Carsey Manning FE-0090
SAN JUAN, TEXAS BRANCH 7-3206
Night and Holiday Numbers
PARTS
W. R. Bethel 7-3252
SERVICE
W. R. Bethel 7-3252
SALES
H. B. Leonard
SAN ANTONIO, TEXAS Representative ..... LE 4-0851
Night and Holiday Numbers
R. O. Brehm ..... PE 4-9373
Jess Hellums ..... LE 4-7381
TYLER, TEXAS Representative 2-1032
Night and Holiday Number
J. W. Ellis 2-1032
LONGVIEW, TEXAS Representative ..... Plaza 8-5564
Night and Holiday Numbers
PARTS
Jack Price (Industrial Power & Supply) ..... Plaza 8-4622
SERVICE
John Stoddard (Industrial Power & Supply) Plaza 3-2088
SALES
Bill Foster (Industrial Power & Supply) Plaza 8-8626
WICHITA FALLS, TEXAS Representative 2-5229
Night and Holiday Numbers
PARTS
W. E. Rutledge (Mike Carter Engine Works) 7-7534
SERVICE
W. E. Rutledge (Mike Carter Engine Works) 7-7534
SALES
Mike Carter (Mike Carter Engine Works) 2-8522
PORT ARTHUR, TEXAS Representative 3-2510
Night and Holiday Numbers
PARTS
Walter Rastelli (Sabine Propeller & Marine Service) 3-6292
SERVICE
Walter Rastelli (Sabine Propeller & Marine Service) 3-6292
SALES
Cliff Broussard (Sabine Propeller & Marine Service) 2-3803
Howard Perkins (Sabine Propeller & Marine Service) 5-8981
BROWNSVILLE, TEXAS Representative 2-3114
Night and Holiday Numbers
PARTS
C. R. Horn (Semco) 6-6249
SERVICE
R. E. Spriggs (Semco) 2-2487
SALES
R. E. Spriggs (Semco) 2-2487
NEW YORK, N. Y. Representative ..... WHitehall 4-3954
Night and Holiday Number
SALES
Ed Carney (Export Tool Co.) ..... GEdney 4-9281
AUSTIN, TEXAS Representative (Irrigation only) 2-9792
Night and Holiday Number
SALES, PARTS & SERVICE
Jack Myers (Myers Irrigation Co.) 8-4589
UVALDE, TEXAS Representative (Irrigation only) 1431
Night and Holiday Number
SALES, PARTS & SERVICE
Clint Bracher (Able Irrigation Co.) 1431
HEARNE, TEXAS Representative (Irrigation only) 163
Night and Holiday Number
SALES, PARTS AND SERVICE
J. Copora (Hearne Equipment Co.) 900
CLEVELAND, TEXAS Representative (Irrigation only) 660
Night and Holiday Number
SALES, PARTS AND SERVICE
Gervis Hall (Hall Motor Co.) 660
GRAPELAND, TEXAS Representative (Irrigation only) 36
Night and Holiday Number
SALES, PARTS AND SERVICE
Bill Brown (Brown Motor Co.) 36
ARANSAS PASS, TEXAS Representative (Parts and Service only) 556
Night and Holiday Number
PARTS AND SERVICE
Cliff Kinkade (Kinkade's) 556
PORT LAVACA, TEXAS Representative (Parts & Service only) 501
Night and Holiday Number
PARTS AND SERVICE
Auto Parts Machine Co. 501

IF YOU NEED SERVICE USE THIS

CHRYSLER · PARTS · SERVICE · STEWART & STEVENSON SERVICES · ANYTIME · ANYWHERE · climax · GM DIESEL POWER

24-HOUR SERVICE DIRECTORY

THERE'S NO SERVICE LIKE STEWART AND STEVENSON SERVICE

Stewart & Stevenson men walk into customer problems . . . not away from them. Stewart & Stevenson has built the Nation's largest Diesel engine distribution organization on two simple customer-service principles.

1. PARTS AND SERVICE — The largest distributor of GM Diesel parts in the Nation plus factory trained mechanics to use them when needed.

2. EXPERIENCE — A backlog of experience and know-how gained through the installation of more different types of Diesel applications than any other distributor of Diesel engines.

If you have a problem, we want to know about it. Stewart & Stevenson has no unlisted telephone numbers. A call to one of the numbers listed opposite is your assurance of the quickest, most economical, top-quality engine service. Tack this page on the wall or slip it under your desk glass; but KEEP THIS PAGE.

If you have outlying field operations and want extra copies of this page write or phone Stewart & Stevenson Services. The copies will be sent pronto.

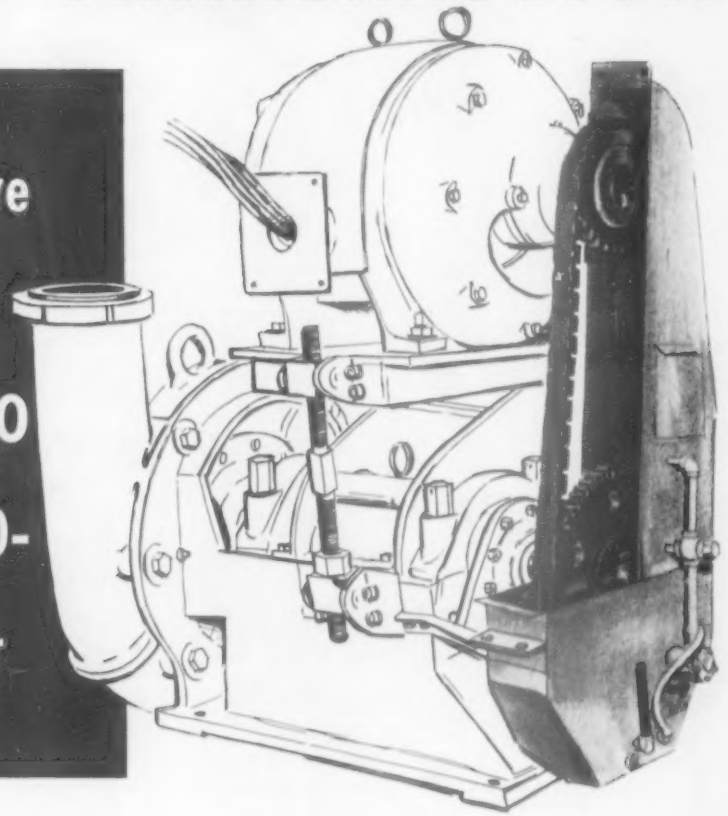
STEWART & STEVENSON SERVICES, Inc.

4516 HARRISBURG BLVD., HOUSTON

THE NATION'S LARGEST DISTRIBUTOR OF GM DIESEL ENGINES

HY-VO facts for a new age in POWER TRANSMISSION

How you can save up to $1,407.00 with MORSE HY-VO on a 350-hp., 1800-rpm electric motor



Now, with Morse Hy-Vo Drives, you can gain new advantages from buying smaller, higher speed, more efficient electric motors.

You save weight, space, and electric power. And in most cases, the difference in cost between a low-rpm motor and a high-rpm motor of the needed horsepower, will more than pay for the Hy-Vo Drive. Let's look at an example:

Generally, the commonly used methods of power transmission, due to inherent restrictions on rotative speed and velocity, limit the speed of 200-hp. or larger motors to 1200 rpm. Hy-Vo's upper limits are far greater, ranging up to 3600 rpm for ¾" pitch.

Suppose you needed a 350-hp. motor. According to the catalog base price of one prominent motor manufacturer, a 1200-rpm, 350-hp. motor costs $13,709. But an 1800-rpm, 350-hp. motor costs only $12,302. You save up to $1,407. Also, your higher rpm motor would weigh 200 pounds less.

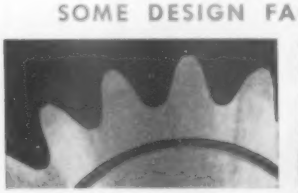
And with a narrow Hy-Vo, it's very likely you'd do away with the cost of outboard bearings and mountings. Bonus savings!

Write us for detailed information on the savings Hy-Vo will bring in your electric-motor applications, or of the comparable savings Hy-Vo can make, because of its high rotative and velocity limits, on your internal combustion engine applications.

MORSE CHAIN COMPANY

7601 Central Avenue • Detroit 10, Michigan

SOME DESIGN FACTORS BEHIND HY-VO'S SUCCESS...



Hy-Vo's many design and manufacturing refinements result in a drive with unusual power-transmitting capacity. Note involute tooth design of Hy-Vo Sprockets . . .

. . . and the new, Hy-Vo Compensating Rolling Joint, which always shifts the pitch line automatically as the Hy-Vo Chain engages the involute teeth of the sprocket.

Chain follows a path truly tangent to sprocket pitch circle, thus almost eliminating chordal action. A new, balanced link design greatly improves stress distribution.

MORSE

MECHANICAL POWER TRANSMISSION PRODUCTS

PIONEER'S *Know How*

Another of
HILL, HUBBELL's
"Things That Money
Can't Buy"

FIRST IN THE FIELD in point of time... Hill, Hubbell has remained FIRST. One reason is the instinctive "know-how" that can come only from constant association with a business from its inception — a "know-how" that reflects the engineer's science with the hard-knocks of actual experience in plant and field.

HILL, HUBBELL and COMPANY
Factory Applicators of Pipe Coatings and Wrappings
DIVISION OF GENERAL PAINT CORPORATION
3091 Mayfield Road • Cleveland 18, Ohio

LEADER IN PIPE PROTECTION
FOR MORE THAN A QUARTER CENTURY

AVAILABLE JOHNSTON by AL CAPP

THET'S ACCURATE SHOOTIN'!!
ONLY ONE GUY IN THESE PARTS, MO' ACCURATE THAN ME!!
THAT'S ME— ACCURATE JOHNSTON!!
AN' NOBODY'S MORE AVAILABLE THAN ME— AVAILABLE JOHNSTON!!
AVAILABLE FO' WHUT?— COURTIN'?
NO MA'M—FO' TESTIN' OIL WELLS, WITH MINNYMUM DOWN TIME!!
WE IS ALLUS FAST, AS WELL AS ACCURATE!!
Al Capp

C 5412

Copr. Capp Enterprises 1954

JOHNSTON TESTERS

first in drill stem testing

HOUSTON, TEXAS

LOS ANGELES CALIF. • CALGARY CAN

FORMATION AND CASING TESTING — JOHNSTON

ATTENTION PLANT ENGINEERS!

In considering rigid, unplasticized Polyvinyl Chloride pipe, valves, fittings or custom fabrications watch for these 4 important factors:

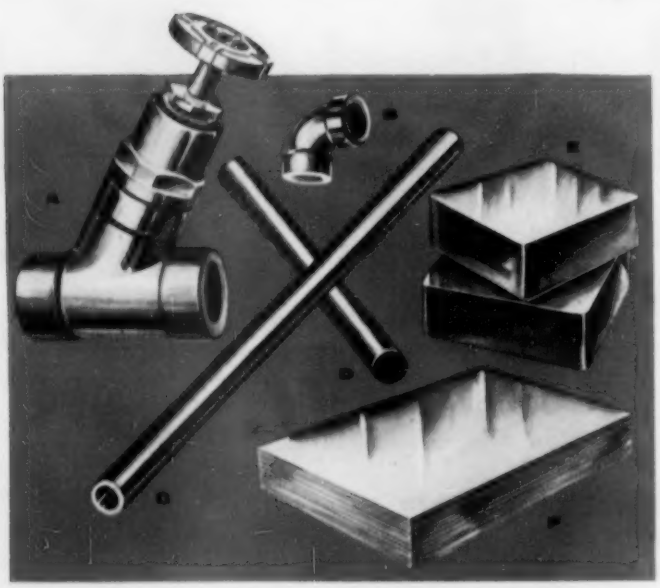
1 **Is the product properly manufactured?**
Boltaron 6200 is produced under rigid standards by the Bolta Division of The General Tire and Rubber Company.

2 **Is it properly fabricated and designed?**
Only well-trained, experienced engineers and fabricators are qualified to fill your individual needs. Every Boltaron fabricator in the United States and Canada is trained and licensed by Hartwell & Son.

3 **Is the application right?**
Unplasticized PVC is NOT a panacea for all industrial ills. It can and will perform with a high degree of satisfaction when properly applied to your specific problems.

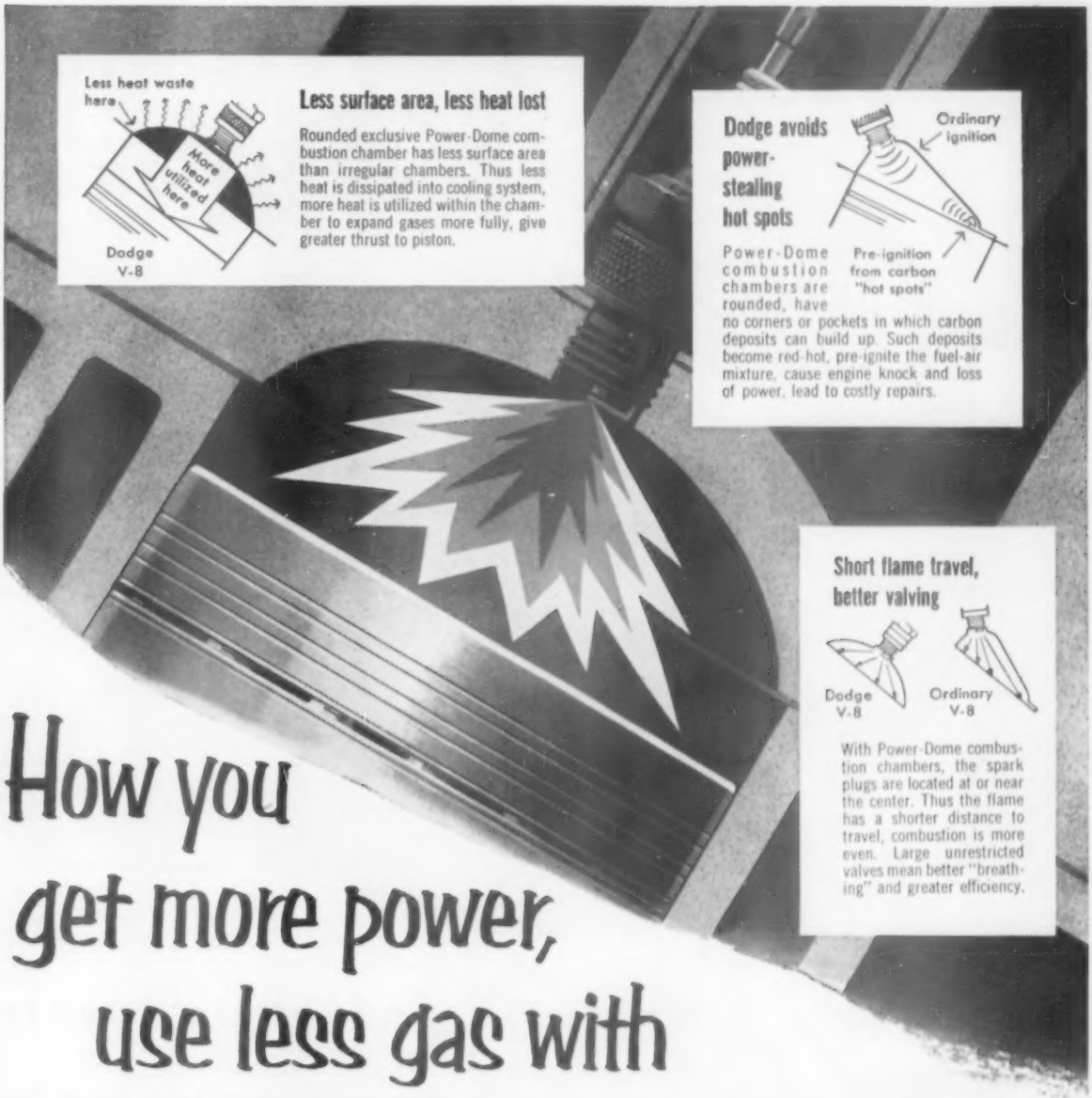
4 **Are the company and the product proven in use?**
Hartwell & Son have been exclusive distributors of Boltaron for years. A list of their many successful installations in a wide range of industries can be supplied on request.

Boltaron 6200

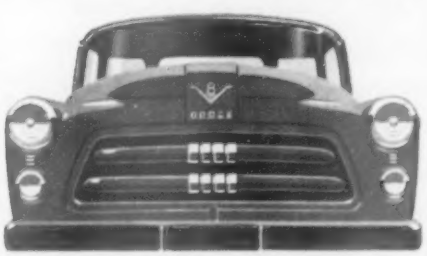


With Boltaron 6200 you can obtain *from one source* a complete line of unplasticized PVC materials. Substantial inventories are kept at all times for prompt shipments. For further information write H. N. Hartwell & Son, Inc., Park Square Building, Boston, Mass., Box 119.

A All-Molded Valves
B Molded Fittings
C Seamless Pipe
D Rod Stock
E Block Stock
F Sheet Stock


Less heat waste here
More heat utilized here
Dodge V-8
Less surface area, less heat lost
Rounded exclusive Power-Dome combustion chamber has less surface area than irregular chambers. Thus less heat is dissipated into cooling system, more heat is utilized within the chamber to expand gases more fully, give greater thrust to piston.
Dodge avoids power-stealing hot spots
Ordinary ignition
Pre-ignition from carbon "hot spots"
Power-Dome combustion chambers are rounded, have no corners or pockets in which carbon deposits can build up. Such deposits become red-hot, pre-ignite the fuel-air mixture, cause engine knock and loss of power, lead to costly repairs.
Short flame travel, better valving
Dodge V-8
Ordinary V-8
With Power-Dome combustion chambers, the spark plugs are located at or near the center. Thus the flame has a shorter distance to travel, combustion is more even. Large unrestricted valves mean better "breathing" and greater efficiency.

How you get more power, use less gas with POWER-DOME V-8 truck engines!



Truck owners everywhere report more power and less fuel consumption with new Dodge Truck Power-Dome V-8 engines. AAA-supervised tests *proved* the power of Dodge Truck V-8's in a history making Pikes Peak climb . . . proved the economy of Dodge Truck V-8's in a sensational 22-mile-per-gallon Economy Run.

Look at the pictures and captions shown on this page—then, for further details and an eye-opening road test, see your dependable Dodge Truck dealer!

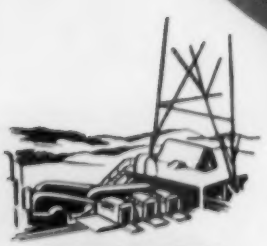
DODGE "Job-Rated" TRUCKS

A PRODUCT OF CHRYSLER CORPORATION

ENSIGN

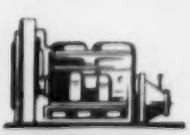
GAS CARBURETION

The Ensign Model "S" Fuel Regulator and Model "Xg" Carburetor With Built-In Economizer



DRILLING

PUMPING



SERVICING

Where Dependability Counts

Gas engines as a prime source of power for oil well drilling, pumping and servicing, have long been known for their economy and dependability.

Gas engine dependability is closely related to the carburetion equipment employed — its ability to start easily and perform consistently year after year under all field conditions. This is where ENSIGN carburetion plays a particularly important role — a job for which it has become famous in oil fields throughout the world.

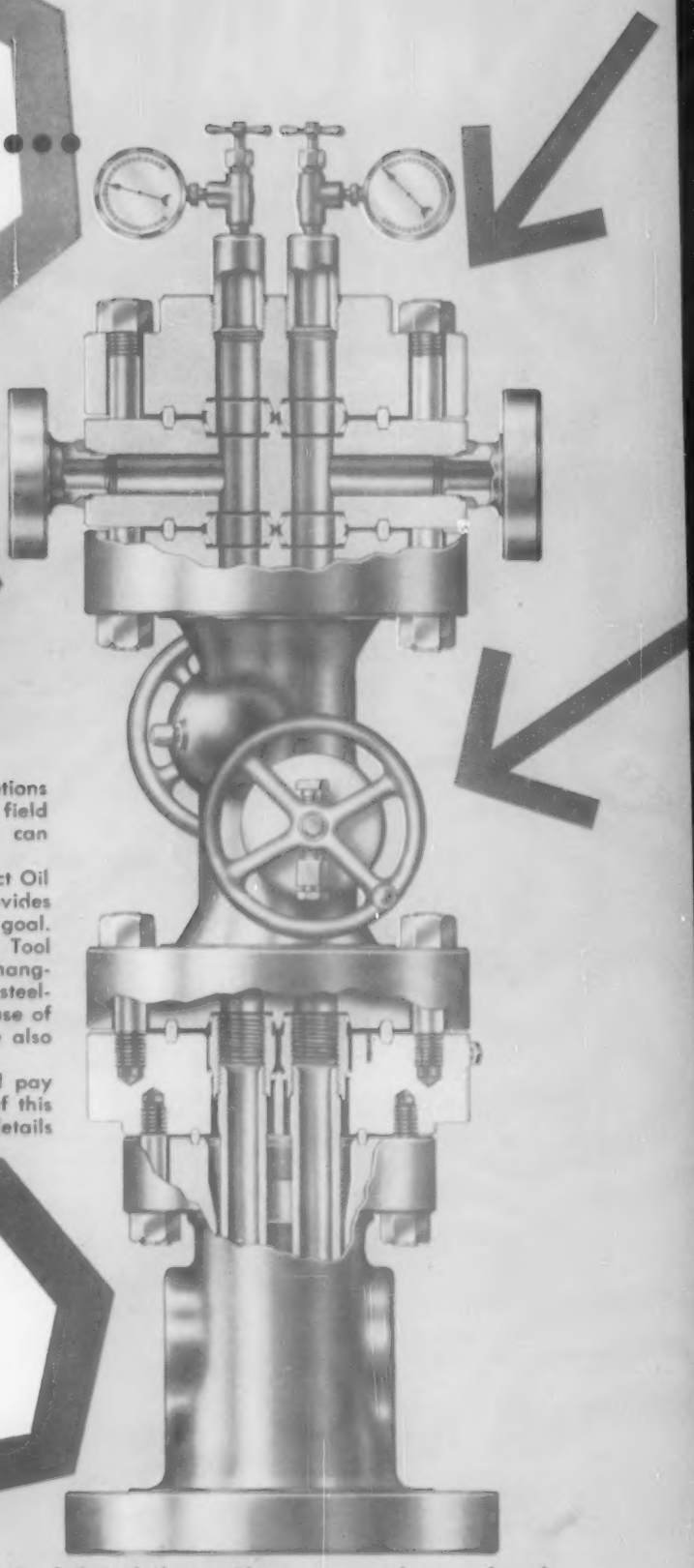
For your gas and LP-Gas carburetion requirements — consult ENSIGN — manufacturers of carburetors exclusively for 44 years.

ENSIGN CARBURETOR COMPANY

7010 S. Alameda St., Box 229, Huntington Park, Calif.
Branch Factory, 2330 W. 58th St., Chicago 36, Illinois

If you make a DUAL COMPLETION...

MAKE IT O·C·T



FROM AN ECONOMIC STANDPOINT, dual completions provide the industry with substantial savings in any field where conditions are such that dual completions can be accomplished.

FROM AN EQUIPMENT STANDPOINT, this compact Oil Center Tool Company Christmas Tree assembly provides a safe, strong and practical means to the economic goal.

In developing this dual assembly, Oil Center Tool Company presents these new features: 1. a special hanging and sealing flange on top of the tubing head; 2. steel-to-steel seals throughout the assembly through the use of Flex-Float steel rings. Standard API ring joints are also used as a seal from the atmosphere.

If you are considering dual completions, it will pay you to check these features and get the full story of this new O-C-T Dual Completion Assembly. Write for details or ask your nearest O-C-T Representative.

O·C·T

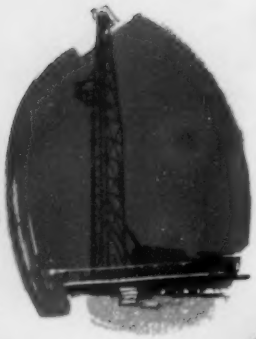
OIL CENTER TOOL CO.

P. O. Box 3091, Houston, Texas

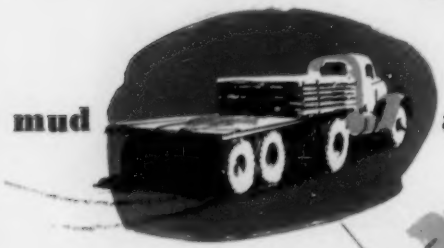
Expert Representatives: Sterling Areas—Le Grand, Sutcliff & Gell, Ltd., Rochester, Kent, England. South America—East West Oiltools, C. A., Del Lago Hotel, Maracaibo, Venezuela. Address Export Inquiries for All Other Countries to P. O. Box 3091, Houston, Texas.

Dual Completion equipment was pioneered and introduced FIRST by O-C-T as early as 1941

Magcobar means more than

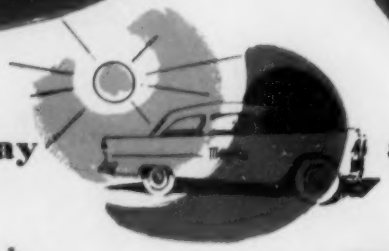


mud



alone . . .

it means day



and night

nation-wide

mud engineering service.

It's a twenty-four hour, day and night job to give the kind of service the oil industry needs. And Magcobar mud engineers and dealers alike gladly accept this requirement for good service. Ever since Magcobar entered the drilling mud picture, field mud engineering service has been constantly improved and expanded. In fact, Magcobar alone today has more mud engineers in the field than the total of all mud companies just a decade ago. When you need service at your well, call the dealer who stocks Magcobar. You'll get the best mud service in the oil fields.

Magcobar
Complete
DRILLING MUD SERVICE

MAGNET COVE BARIUM CORPORATION
ONE OF THE DRESSER INDUSTRIES
HOUSTON, TEXAS

They Say—

"Critical Problems"

"For some time to come, the prospects for a greatly improved business outlook will depend on what the industry can do to cope with its critical problems. The nation today has tremendous excess producing capacity of over 1,700,000 bbl. a day . . . This idle capacity — now too large—is becoming an increasing financial load for producers to carry. Relief in the form of higher production is long overdue.

"But domestic production cannot rise as much as it should while imports keep growing . . . There is no doubt but that this flood of foreign oil may become detrimental to our domestic oil economy . . ."

E. F. Bullard, president, Stanolind Oil & Gas Co., in an article appearing in the February issue of Horizons, Stanolind publication.

Chronology Planned

Dear Sir:

I have just completed filling out the form which you send on renewal subscription in which you ask for comments.

There is one service which a publication such as yours might render in its annual Review and Forecast Number . . . This would be a chronology of important happenings which affect the petroleum industry . . .

A. W. Neal
Gulf Oil Corp.
Pittsburgh, Pa.

Editor's Note: Subscriber Neal's suggestion is very good, and an "oil chronology" will be added to next year's Review and Forecast Number.

'Tain't Meant To Be

"The duffer was having a particularly bad day. After a number of frenzied but futile attempts to get out of a sand trap, he turned to his caddy and remarked: 'Golf's a funny game.'

" 'Tain't meant to be,' snorted the caddy.

"The same remark would do to answer those who continually complain about their troubles with Government—about high taxes, wasteful

VICTAULIC METHOD OF PIPING

VICTAULIC COUPLINGS

Styles 77, 77-D for standard applications. Simple, fast to install—sturdy and reliable. Sizes ¾" to 30". Style 75 Light-Weight Couplings for light duty applications. Sizes 2", 3", 4". Additional styles for cast iron, plastic and other pipes. Sizes through 60".

VICTAULIC FULL-FLOW FITTINGS

Complete line of Elbows, Tees, Reducers, Laterals, etc.—to fit all Victaulic Couplings. Streamlined for top efficiency, easy to install. Sizes ¾" to 12".

VIC-GROOVER TOOLS

Handy, on-the-job grooving tools that do the work in half the time. Light weight, easy to handle—operate manually or from any power drive. Automatic groove position and depth. Sizes ¾" to 8".

ROUST-A-BOUT COUPLINGS

Style 99 for plain or beveled end pipe. Best engineered, most useful plain end joint on the market. Simple, husky — easy and fast to install. Takes strong bull-dog grip on pipe. Sizes 2" to 8".

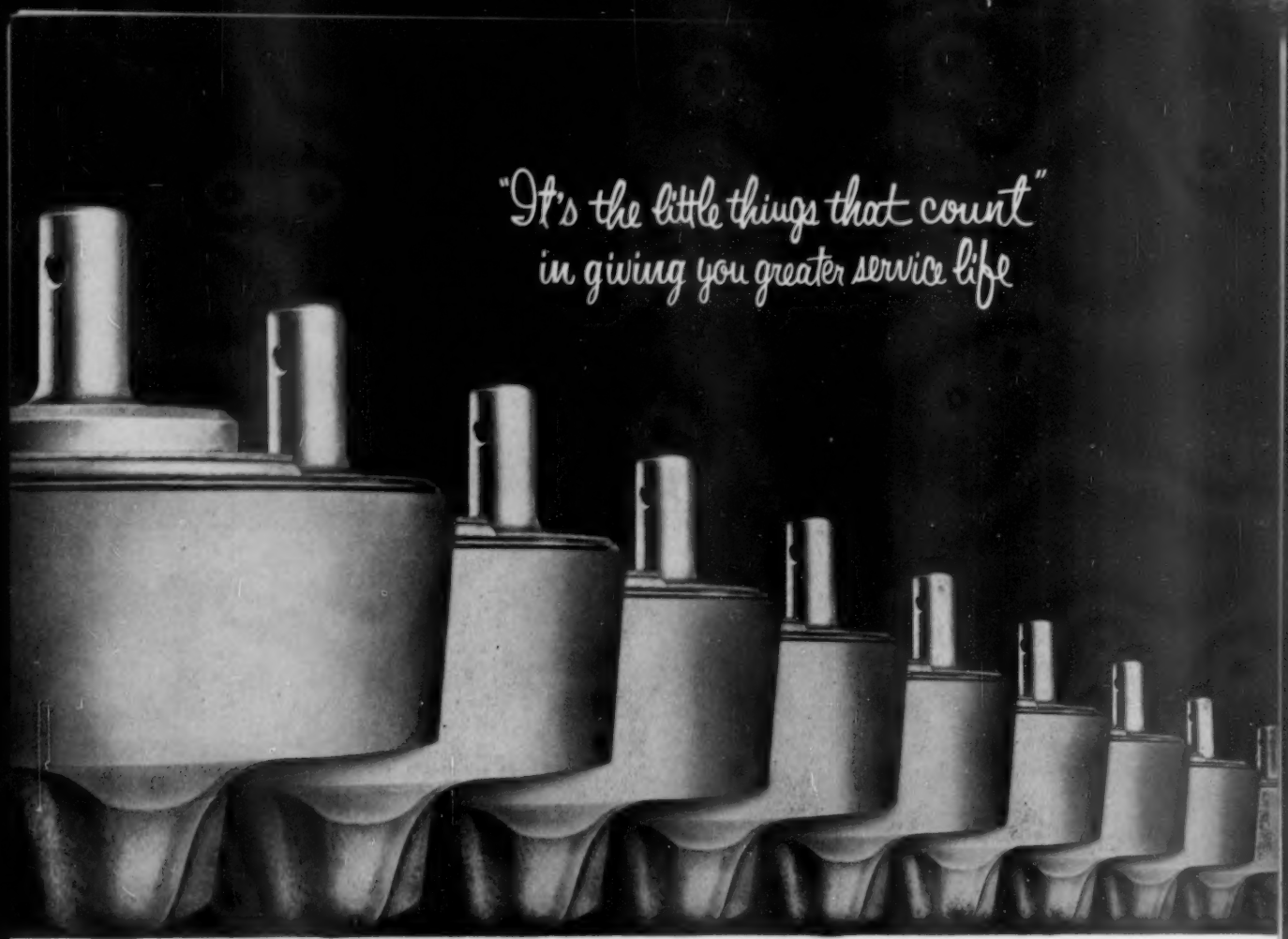
VICTAULIC SNAP-JOINTS

Victaulic's new boltless, speed coupling. — Style 78 — hinged into one assembly. Hand-locks for time and dollar savings. Sizes 1", 1¼", 2", 3", 4".

EASIEST WAY TO MAKE ENDS MEET

Promptly available from distributor stocks coast-to-coast. Write for NEW Victaulic Catalog-Manual 55-3E.

VICTAULIC COMPANY OF AMERICA
P. O. Box 509 • Elizabeth, N. J.



Where Mission makes the difference

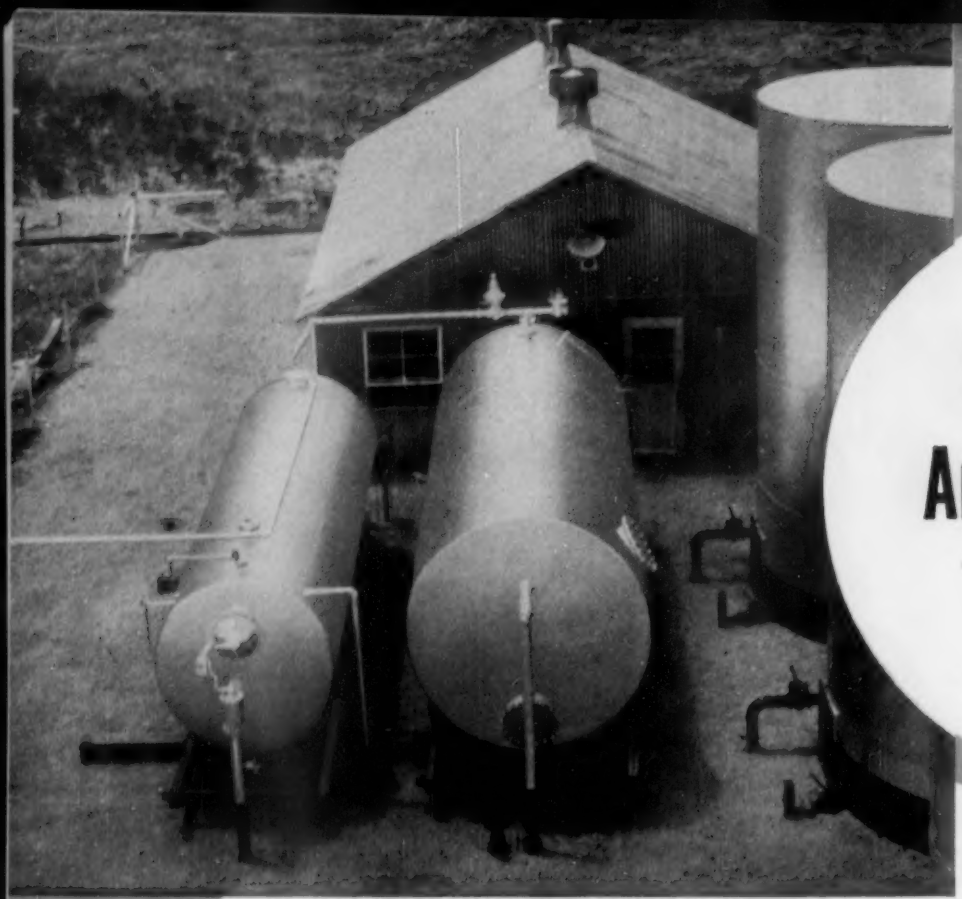
You enjoy longer and lower slush pump valve costs today because a small replaceable Mission bushing multiplies valve seat life by as much as five times. Here's where this little bushing gets its start in your Mission Silver Top Valve's life . . . and here is where Mission begins to make the difference in your valve costs. This wear-taking Mission Bushing is carefully finished on the most modern machines to exact tolerances to insure that it fits perfectly in any Mission Silver Top Valve seat of the same size. Thus, you can have full confidence when you "change the bushing and save the seat" that your Mission Silver Top Slush Pump Valve will perform like new again. This means lower replacement costs and iess time spent changing valve seats. And since the seat stays in the pump longer without removal, danger of washouts between the seat and deck is reduced. Always specify Mission Valves to your supply store so that you can be sure to take advantage of the difference that Mission makes in reduced valve costs, longer life and superior service.

Nothing but the finest will ever bear the name of

MISSION
MANUFACTURING CO.

P. O. BOX 4209 • HOUSTON, TEXAS

Export Office: 30 Rockefeller Plaza, New York



Introducing Another New Product...

...The BS&B Salt Water Disposal System...

Individually Designed to YOUR Water-Flooding Requirements!

After more than a year of field testing, BS&B is pleased to announce the newest member of its large family of oilfield production equipment . . . a closed type Salt Water Disposal System!

This system can be custom tailored to *your* water-flooding requirements and operating conditions. Its flexibility of design enables you to use it as a complete water disposal system—or to employ only parts of it to augment your existing installation.

Basically, the BS&B Salt Water Disposal System consists of a primary separating unit (free water knockout or emulsion treater), an oil skimmer, a combination filter and backwash vessel, and auxiliary equipment.

Under certain conditions, however, a separate filter and backwash water accumulator may be used, depending on the degree of water treatment required, and upon the condition of the produced water and the characteristics of the formation into which the water is injected.

The "heart" of the BS&B System is an improved type of filter using porous aluminum oxide underdrain plates under a filter bed of Anthrofilt No. 1. In comparative tests, this type of filter has been found to be greatly superior to the graded bed filters of sand and gravel commonly used in other systems.

If you'd like more information on the new BS&B Salt Water Disposal System, contact your nearest BS&B Representative or write to . . .

BLACK, SIVALLS & BRYSON, INC.

Oil & Gas Equipment Division, Dept. 1-A3

1708 West Main Street Oklahoma City, Oklahoma

Advantages of BS&B Type Filter Over Graded Bed Type Filters:

- Filter runs are longer before backwashing is necessary.
- Only half as much backwash water is required for cleaning.
- Filter material weighs approximately half as much.
- Filter material does not react with alkaline water, algae, bacteria or such dissolved chemicals as iron or hydrogen sulphide.
- Filter bed does not pack as tightly, resulting in a lower pressure drop.
- Higher porosity and greater surface area of filter material results in more efficient removal of turbidity and bacteria.

spending, slipshod planning of public projects, laws, and regulations that make the businessman spend more time on paper work than on earning his living.

"If Government is like that in the United States, 'tain't meant to be . . ."

Neil W. Printup, executive secretary, Georgia Petroleum Industries Committee, in an article appearing in the February issue of the Georgia P.I.C. News.

Proper Identification

Dear Sir:

We have received the February 7th issue of The Oil and Gas Journal and appreciate your using the photograph (page 81) and a portion of the news release we sent to you . . .

In our news release we indicated that the structures being erected were Houdriflow units and in the caption for the photograph someone changed the Houdriflow to Houdriforming . . .

E. N. Zimmerman
Chicago Bridge & Iron Co.
Chicago.

Editor's Note: We erred in identifying the Houdriflow catalytic cracking units under construction at Sun Oil Co.'s Marcus Hook and Toledo refineries as Houdriforming units. The company also is building Houdriformers at the refineries, but the photo is of the Houdriflow units.

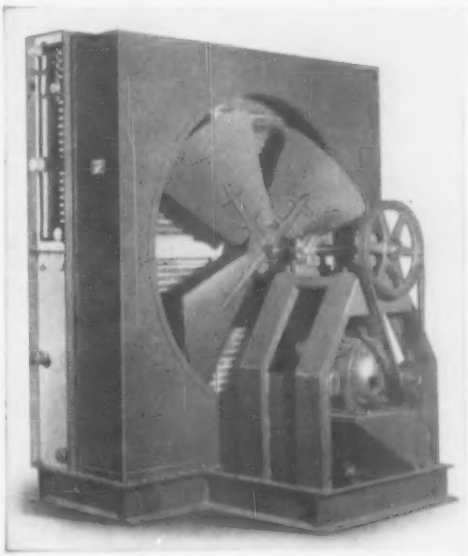
Moth-balling Refineries

"There is a reason why stocks have built up. During the Korean conflict, the Government saw the need for additional refining capacities to meet the possible demands for an all-out war. The oil industry was requested to increase refining capacity by one million barrels . . . The industry cooperated . . . What was not taken into account was the fact that private industry would operate this new capacity to get a return on its new investments.

"Meanwhile the Korean affair was concluded and defense purchases decreased sharply. The very obvious result was stocks of refined products greater than required for normal consumption. Supplies from this new refining capacity have caused a softening of refinery product prices and a very general decrease in refinery earnings . . .

"A much better way to create extra refining capacity for defense is to build stand-by facilities financed by the Government, to be inactive and held in re-

THEY'RE **BEATING THE HEAT**
(AND HIGH COSTS)
WITH
"BUFFALO"
"PACKAGE"
COOLERS
LIKE THIS



- Units cooling BOTH jacket water and cylinder oil of diesel compressors.
- Combination of efficient "Buffalo" Heavy-Duty NV Fan and quality finned coil in one compact "Package."
- Low-cost installation — units shipped complete, ready to connect and start.
- Propeller fan economy plus "Q" Factor* performance that's in all "Buffalo" products.

SEE THE BIG-FAN JOBS these husky, efficient, easily installed package propeller fans are doing — cooling large rooms and buildings — handling fumes — working against pressures up to 1" — high temperature and many other applications. *Write for Bulletin FM-1234.* It's an eye-opener on air at work economically!

**The "Q" Factor — the built-in Quality which provides trouble-free satisfaction and long life.*

"Buffalo"

BUFFALO FORGE COMPANY
525 BROADWAY BUFFALO, N.Y.
PUBLISHERS OF "FAN ENGINEERING" HANDBOOK
Canadian Blower & Forge Co., Ltd., Kitchener, Ont.
Sales Representatives in all Principal Cities

INDUSTRIAL EXHAUSTERS BELTED VENT SETS PROPELLER FANS "E" BLOWERS-EXHAUSTERS

"Our Cardwell Model D's

DRILLING WORKOVERS

HOWARD PARKER COMPANY
SAN JACINTO BUILDING
PReston 9127
HOUSTON 2, TEXAS

November 11, 1954

Mr. H. W. Cardwell
Cardwell Manufacturing Company, Inc.
P. O. Box 2001
Wichita 1, Kansas

Dear Mr. Cardwell:

For your information and your files, we are enclosing herewith, certain compiled data relative to the operation of our two Cardwell Model "D" Rigs, in which we feel you will be interested.

As you know, our first Model "D" was delivered on January 1, 1954, and in the past ten month period this rig has drilled, with 4½" drill pipe, an accumulated footage of 71,300 feet of hole, comprised of the following:

One	7,700 foot hole
One	7,200 foot hole
* Two	6,700 foot holes
Three	5,500 foot holes
Five	5,300 foot holes

The total number of trips involved in making this amount of footage was 164 with drill pipe and 25 with tubing.

Our second Model "D" Rig was delivered to us on May 10, 1954. This rig has drilled, with 4½" drill pipe, an accumulated footage of 35,000 feet of hole, comprised of the following:

One	8,992 foot hole
* One	8,445 foot hole
One	7,850 foot hole
One	6,000 foot hole

In the drilling of these four wells, two were side-tracked and directionally drilled. The total number of trips involved in the drilling of this 35,000 feet of hole was 120 with drill pipe and 8 with tubing.

We are impressed, not only by the smooth operation of these rigs, but doubly so by the small amount of down time due to repairs, which is practically negligible. Our men class them as the best in the field in their capacity.

Yours very truly,

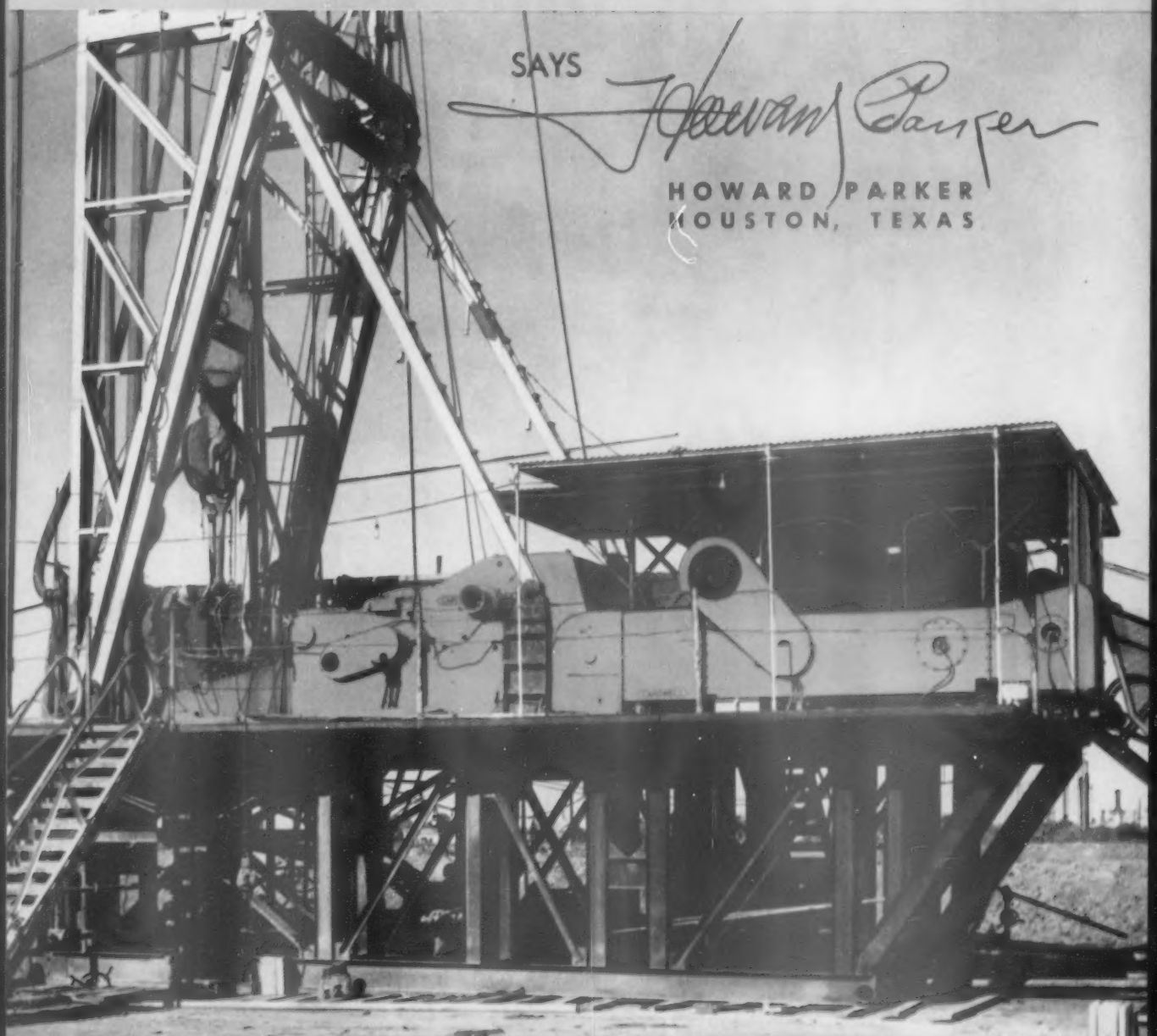
HOWARD PARKER COMPANY

By Howard Parker

HP/lr
Encls.

* MODEL D IS RECOMMENDED FOR DRILLING TO 5,000 FEET WITH 4½-INCH DRILL PIPE

are the best in the field"



FEATURES OF THE CARDWELL MODEL D...

Furnished as a single- or double-drum rig, with one or two engines. The special Cardwell friction clutched chain transmission provides four instantly available forward speeds and one jaw clutched reverse to the drum and rotary table. Friction clutches inside the transmission case control the shifting of each forward speed and eliminates stopping to change speeds. Cardwell air friction clutches are used in drum ends, transmission, rotary drive and mud pump drive. Draw works is lightweight and compact, and moves with engines in place. Write or wire for full information, or see your nearest Cardwell representative.

CARDWELL
REG. U. S. TRADE MARK PAT. OFFICE
THIS TRADE MARK INSURES HIGHEST QUALITY AT LOWEST PRICE

CARDWELL MFG. CO. INC.
P. O. Drawer 2001 . . . Long Distance Telephones 128—129—130
Cable Address "ALL STEEL," Wichita — "CARDSTEEL," New York
Wichita, Kansas, U. S. A.

THERE IS A CARDWELL PARTS STOCK NEAR OR IN EVERY OIL FIELD OF THE WORLD

ALTEN PUMPING UNITS

Selling to beat the BAND

They are The Trend of TOMORROW

Last year Alten sales surged to an all time high because Alten has consistently offered more—and now—for 1955—Alten has designed and produced a line of pumping units with so many incredible improvements that it is years ahead of the field . . . SEE AND BE AMAZED . . . you'll realize that this is indeed something big. You'll see an ultra-new kind of a unit that will drive pumping costs down year after trouble-free year. Here is tomorrow's pumping unit today!

Write for this booklet

Get all the facts on new Alten units—send a postcard for this descriptive booklet—your copy is waiting.

ALTEN
FOUNDRY & MACHINE WORKS INC.
LANCASTER, OHIO

serve for operation as needed . . . This is no new theory. It has been used by our Government in the case of strategic metals and rubber. Planes, ships, cars, and trucks have been put in moth balls, and stockpiling of many items has been a military necessity . . ."

T. M. Martin, president, Lion Oil Co., in an address before the New York Society of Security Analysts.

The Geophysicists' Problems

Dear Sir:

As an active geophysicist, I was much interested in your staff article concerning the current difficulties of geophysics—"Point of No Return," December 20, 1954. While I agree as to these difficulties, the idea that they are novel is news to me. I have been in this business since 1933 . . . the article might have been as appropriate to any of the intervening years . . .

Paul F. Clement
Western Gulf Oil Co.
Los Angeles

CALENDAR OF EVENTS

MARCH

17-18 Southern Gas Association, Distribution Management Conference, Jung Hotel, New Orleans.

20-23 American Institute of Chemical Engineers, Kentucky Hotel, Louisville.

23-24 Pacific Coast Gas Association, accident prevention conference, Santa Barbara, Calif.

23-25 American Petroleum Institute, Division of Production, Mid-Continent District, Herring Hotel, Amarillo, Tex.

26 North Texas Oil and Gas Association twenty-fifth annual meeting, Wichita Falls, Tex.

27-29 Texas Independent Producers and Royalty Owners Association, ninth annual meeting, Hotel Texas, Fort Worth.

28-30 Western Petroleum Refiners Association, 43rd annual meeting, Plaza Hotel, San Antonio.

28-31 American Association of Petroleum Geologists, Society of Exploration Geophysicists, and Society of Exploration Paleontologists and Mineralogists, annual meeting, Hotel Statler, New York.

28-April 1 American Society for Metals, 9th western exposition and congress, Pan American Auditorium, Los Angeles.

30-April 1 17th annual American Power Conference, sponsored by Illinois Institute of Technology, Sherman Hotel, Chicago.

APRIL

4-5 Wilcox Trend Symposium, Eighth Oil Recovery Conference, Texas Petroleum Research Committee, Texas A. & M. College, College Station, Tex.

5-7 Corrosion control short course, sponsored by University of Oklahoma and

Editorial Objectives . . .

Once in a while it is good for all of us to take inventory, to review objectives, and draw a fresh bead on one's target.

We've been doing just that here at the Journal. As usual, it has been our editorial objectives that have been the subject of our most aggressive action.

But nothing dramatically new has emerged. It has been largely a matter of reaffirming an old and time-proved set of convictions that both reader and advertiser are best served when we

- Sell petroleum know-how at the management level.
- Develop it at the engineering level.
- Teach it at the maintenance level.

This is not a task for amateurs, or beginners. Its accomplishment demands a penetrating insight into industry problems that comes only by living with that industry year after year, and through constant contacts with its leaders as well as its rank and file. It comes about by having a restless and adequate staff of experienced editors trained in reporting and skilled in sifting and assorting facts. (The combined experience of this staff of 36 full-time people is over 500 years.)

When the skills of this editorial powerhouse are teamed up with those of a presentation department (*) that is second to none, you come up with an editorial dish that is not only nourishing and sustaining, but is served up in appetizing, easy-to-read, and rewarding fashion.

Readers must believe we know our business. They show it in the most convincing manner in their power . . . for more than 5 years, 85 per cent of our paid readers have renewed their subscriptions.

And advertisers must believe we know how to build and hold a top-drawer audience for their selling. For more than 5 years the Journal has carried more pages of advertising than any other business paper or magazine anywhere.

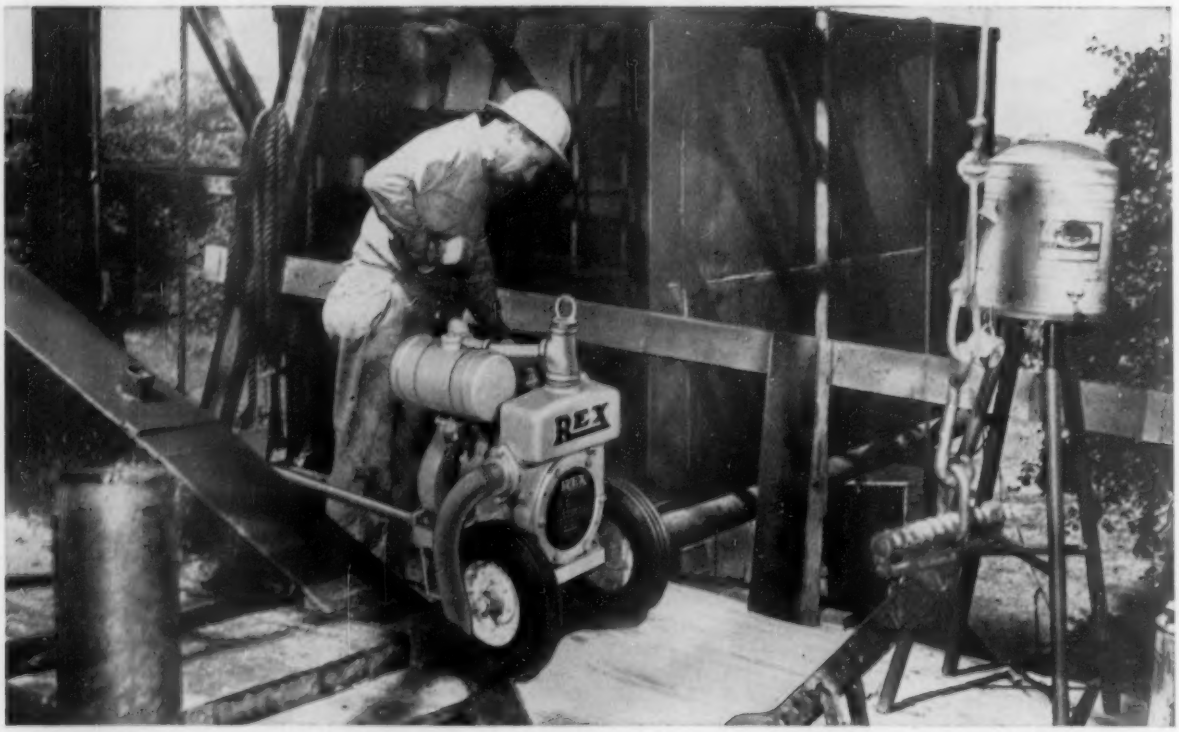
They know, as do we, that . . . "The reader is the most important man to both of us."

*Presentation department. This is the department that takes the raw material the editors hand in, and prepares it for publication. Its efforts are directed to the end of getting the ideas and concepts off the printed page and into the mind of the reader with a maximum of speed and understanding, and with a minimum of road-blocks. Its people are trained in typography, in illustration, in headline writing, and in story organization. It does not think in terms of layout and art, but in terms of streamlining eye movement, quick evaluation of the material, and of efficient reading. Its watchword—"If pretty layout gets in the way of communication, it doesn't stand a chance."

The PETROLEUM PUBLISHING COMPANY

211 So. Cheyenne • Tulsa, Oklahoma

ALSO PUBLISHERS OF: PETROLEO INTERAMERICANO *and* OIL AND GAS EQUIPMENT



REX®

Speed-Primer Pumps Last Longer ...and we can prove it!

Here is the finest pump you can buy for oil field work, and we can prove it with better service, longer pump efficiency and lower costs than with any other pump you can buy.

It's easy to figure the Rex Speed-Primer Pump will give longer service when you consider it's the *only* pump with the patented adjustable air peeler that maintains *new* pump efficiency for the life of the pump.

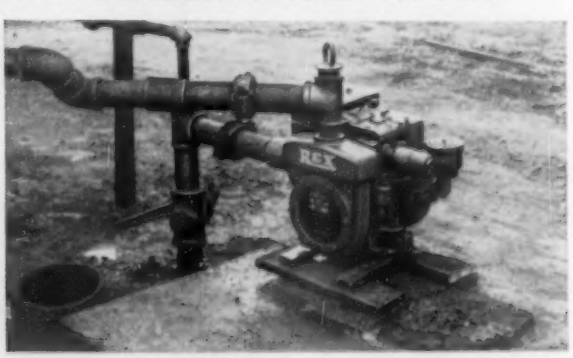
Other reasons we boast about this pump are...instant starting in cold and wet weather...ability to give maximum capacities with mud- and debris-filled water...simplicity of maintenance...portability...positive leakproof seal...and a host of other outstanding advantages that mean top performance under all conditions.

Ask any Rex Pump owner or check at your Oil Field Supply Store. They'll prove what we say! For information on the supply stores that handle Rex Pumps write Rex Oil Field Sales offices in: New York, Tulsa, Dallas, Houston, Midland or Los Angeles.

CHAIN BELT COMPANY

4619 W. Greenfield Ave., Milwaukee 1, Wisconsin

Easily portable, Rex Pumps are the choice for transfer operations, salvaging oil from slush pits, dewatering around storage tanks and general utility service around pipelines and refineries.



Completely self-priming, the Rex Pump has the power and capacity to move big volumes horizontally or vertically. It's an excellent pump, too, for stationary installations as shown here.

Central Oklahoma Section of National Association of Corrosion Engineers, University of Oklahoma Extension Study Center, Norman, Okla.

13-15 Rocky Mountain District, American Petroleum Institute, Division of Production, Gladstone Hotel, Casper, Wyo.

13-15 Natural Gasoline Association of America, annual convention, Baker and Adolphus hotels, Dallas.

13-15 American Society of Lubrication Engineers, tenth annual meeting, Hotel Sherman, Chicago.

13-15 National Petroleum Association, 52nd semiannual meeting, Cleveland Hotel, Cleveland.

18-20 American Society of Mechanical Engineers, spring meeting, Lord Baltimore Hotel, Baltimore.

19-20 Pacific Coast Gas Association, distribution conference, Phoenix.

19-21 Southwestern Gas Measurement Short Course, North Campus, University of Oklahoma, Norman, Okla.

19-22 Vancouver Section, National Association of Corrosion Engineers, corrosion short course, University of British Columbia campus, Vancouver.

20 American Society for Testing Materials —DCC, Kansas regional group meeting, Broadview Hotel, Wichita, Kans.

20-22 Petroleum Industry Electrical Association, annual conference, Shamrock Hotel, Houston.

24-27 American Society of Mechanical Engineers, Region VIII engineering conference, Rice Hotel, Houston.

25-26 Independent Petroleum Association of America, midyear meeting, San Antonio.

28-29 American Petroleum Institute, Division of Production, spring meeting of Pacific Coast district, Statler Hotel, Los Angeles.

29-30 American Association of Petroleum Landmen convention, Hilton Hotel, Fort Worth.

MAY

1-4 Liquefied Petroleum Gas Association, annual convention, Conrad Hilton Hotel, Chicago.

1-4 American Institute of Chemical Engineers, Shamrock Hotel, Houston.

9-10 American Gas Association, Gas Supply, Transmission and Storage Conference, Hotel William Penn, Pittsburgh.

9-12 American Petroleum Institute, Division of Refining, midyear meeting, Jefferson Hotel, St. Louis.

11-12 Pacific Coast Gas Association, gas supply and transmission and conference of technical session, Palm Springs, Calif.

11-13 American Petroleum Institute, Division of Production, Eastern District spring meeting, William Penn Hotel, Pittsburgh.

12-13 Sixth Symposium, "Automation—Engineering for Tomorrow," School of Engineering, Michigan State College, East Lansing, Mich.

12-19 Sixth Latin American Congress of Chemistry, Caracas, Venezuela.

14-22 World Wide Chemical Plant and Equipment Exposition and Congress, Frankfurt, Germany.

16-18 American Petroleum Institute, Division of Transportation, products pipeline confrence, Edgewater Beach Hotel, Chicago.

16-18 Southern Gas Association, New Orleans.

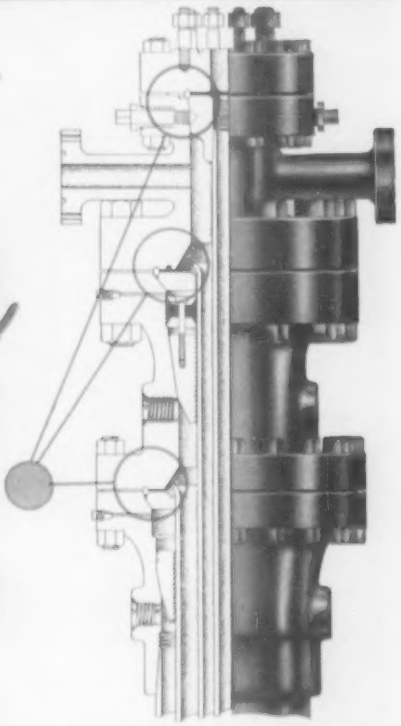
20-22 Appalachian Geological Society, Virginia Geological Survey, and West Virginia Geological Survey, spring field conference, Kavannaugh Hotel, Harrisonburg, Va.

23-25 American Petroleum Institute, Divi-

RECTORHEADS

Seal with Steel all the way

- for Safety
- for Permanence
- for Simplicity



Assembly of Type "RH" Rectorhead Casing Heads with three Casing Strings and Type "M" Tubing Head. Notice how welding ring seats in head body. API Ring Gasket completes the "seal-with-steel."

You wouldn't think of using soft packings between flanges or flanged fittings, particularly where temperatures and pressures are high. Then why use them in casing or tubing heads, where conditions are even more severe, and leaks more disastrous.

When you use Rectorheads you "seal-with-steel." The welded seals, plus API Ring Gasket, never require replacement or maintenance, will not "flow" under high pressure or temperature, will not "freeze" or contract under low temperature, will not burn out or deteriorate. The Rector Welding Procedure is covered in API Std. 6E., Third Edition, January 1952.

Why risk soft seals in your well heads when you don't use them in flanges? Specify Rectorheads and you can "seal-with-steel" between casing strings.

Sold through authorized Supply Stores.

RECTOR WELL EQUIPMENT COMPANY INC

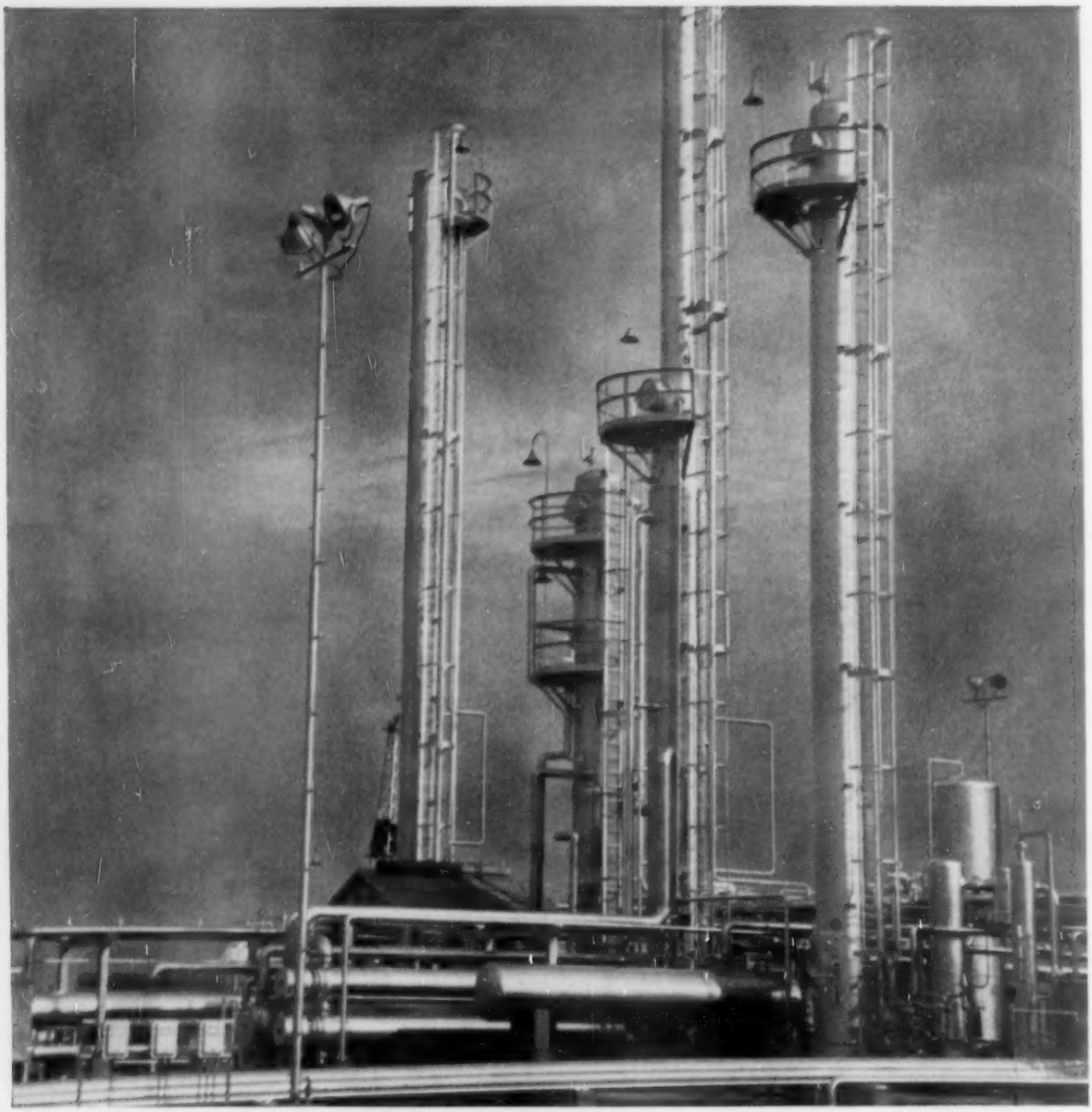
MAKING THE OIL INDUSTRY SAFER

1100 NORTH COMMERCE ST. FORT WORTH, TEXAS

Houston Plant: 2910 Commerce St.

REPRESENTATIVES IN ALL ACTIVE FIELDS

RECTORHEAD RECTORSEAL



Unibestos means stronger, longer lasting pipe insulation

Amosite...the South African asbestos with long, strong, resilient fibers gives Unibestos Pipe Insulation greater strength and superior insulating ability. Built for durability, Unibestos resists both vibrations and shock, and is unaffected by most acid and chemical fumes. When lines must be relocated and replaced, Unibestos can be removed and reapplied with little or no loss of material.

Single Layer Construction Cuts Installation Costs

Unibestos is easily handled—can be cut, mitered, for quick installation, requiring little pointing of joints. Unibestos reduces scaffolding needs, and speeds completion of job.

Unibestos Reduces Heat Loss

Tests prove that Unibestos *single-layer* pipe insulation provides greater protection against heat loss than other nonfibrous double-layer insulations.

STANDARD PRODUCTION SIZES

Unibestos Pipe Insulation is regularly made in 3-foot lengths for pipe sizes from ½″ through 24″, in standard thicknesses through 5″. Unibestos Block Insulation is made in 6″, 12″, 18″ or 36″ widths and in thicknesses from 1″ through 3″ in ½″ increments.

For complete information, write for Descriptive Bulletin 109C.

UNARCO

UNION ASBESTOS & RUBBER COMPANY

332 South Michigan Avenue • Chicago 4, Illinois

sion of Marketing, midyear meeting, Chase and Park Plaza hotels, St. Louis.

26-27 Western Petroleum Refiners Association, technical-industrial relations meeting, Settles Hotel, Big Spring, Tex.

26-27 Kentucky Oil and Gas Association, annual meeting, Lafayette Hotel, Lexington.

30-June 1 Chemical Institute of Canada, thirty-eighth annual conference and exhibition, Quebec City, Que.

JUNE

1-3 Tenth annual Short Course on Gas Technology, Texas College of Arts and Industries, Kingsville, Tex.

5-9 Canadian Gas Association, annual meeting, Sheraton-Broeck Hotel, Niagara Falls, Ont.

6-9 Oil and Gas Power Division, American Society of Mechanical Engineers, 27th annual conference and engineering exhibit, Hotel Statler, Washington, D. C.

6-10 American Petroleum Institute, Division of Production, midyear committee conference, Brown Palace Hotel, Denver.

6-15 Fourth World Petroleum Congress, Rome, Italy.

7-9 National Oil Scouts and Landmen's Association, 32nd annual meeting, Banff Springs Hotel, Banff, Alberta, Canada.

9-10 Natural Gas and Petroleum Association of Canada, Royal Connaught Hotel, Hamilton, Ont.

9-10 Pennsylvania Grade Crude Oil Association, annual meeting, Hotel William Penn, Pittsburgh.

11-15 Petroleum Equipment Suppliers Association, annual meeting, Banff Springs Hotel, Banff, Alberta, Canada.

12-17 Society of Automotive Engineers, golden anniversary summer meeting, Chalfonte-Haddon Hall, Atlantic City, N. J.

16-18 Interstate Oil Compact Commission, Cosmopolitan Hotel, Denver.

20-23 American Society of Mechanical Engineers, semiannual meeting, Statler Hotel, Boston.

23-24 Western Petroleum Refiners Association, technical-industrial relations meeting, Broadview Hotel, Wichita, Kans.

23-26 Rocky Mountain Oil Show, Casper, Wyo.

26-July 1 American Society for Testing Materials, Chalfonte-Hadden Hall, Atlantic City, N. J.

AUGUST

15-17 Society of Automotive Engineers, golden anniversary West Coast meeting, Hotel Multnomah, Portland, Ore.

SEPTEMBER

11-13 Independent Natural Gas Association of America, annual meeting, Jasper Park Lodge, Jasper Park, Jasper, Albert, Canada.

13-24 First International Instrument Congress and Exposition, and ninth National Instrument Conference and Exhibit, Philadelphia.

14-16 National Petroleum Association, 53rd annual meeting, Traymore Hotel, Atlantic City, N. J.

22-23 Western Petroleum Refiners Association, regional technical-industrial relations meeting, Hotel Henning, Casper, Wyo.

22-23 Louisiana - Arkansas Division, Mid-Continent Oil and Gas Association, annual membership meeting, Roosevelt Hotel, New Orleans.

26-28 American Association of Oilwell Drilling Contractors, fifteenth annual meeting, Rice Hotel, Houston.

D+B Kwik-Grip rod clamps permit fast, safe one-man installation . . . eliminate "knuckle busting."

Easy, quick opening is provided by a special forged Tee-head bolt. A quarter turn of the Tee-head permits the bolt to slide through the slot to remove the clamp.

D+B rod clamps, 1-bolt and 2-bolt, meet API specifications for pulling load. Accurately machined ribbed surfaces provide greater gripping power.

Specify the best . . . D+B products. Call CONTINENTAL or your D+B store for service anywhere . . . any time!

D+B DIVISION
EMSCO MANUFACTURING COMPANY
Garland, Texas
LOS ANGELES, CALIF.
Houston, Texas
General Sales Offices: Dallas, Texas

D+B

CONTINENTAL
Serving the Oil and Gas Industries

THE CONTINENTAL SUPPLY COMPANY
General Offices: Dallas, Texas
Representatives in all principal oil fields of the world

E-191-55

FITTINGS THAT *Fit*

Your SUPPLY STORE IS OUR DISTRIBUTOR

W.C. NORRIS MANUFACTURER, INC.

TULSA, OKLAHOMA

WEST COAST DISTRIBUTOR:
REPUBLIC SUPPLY COMPANY OF CALIFORNIA
Los Angeles

Since 1882 QUALITY NORRIS PRODUCTS

BRANCHES:
GREAT BEND, KANSAS; HOUSTON, KILGORE, ODESSA, WICHITA FALLS, TEXAS; SALEM, ILLINOIS; CASPER, WYOMING; OKLAHOMA CITY, OKLAHOMA
EXPORT: 30 ROCKEFELLER PLAZA, NEW YORK CITY

The OIL AND GAS JOURNAL

TULSA, OKLAHOMA

Published every Monday by The Petroleum Publishing Co., 211 South Cheyenne Avenue, Tulsa, Okla. Phone 3-6291. Founded in 1902. Name changed to The Oil and Gas Journal in 1910 by Patrick C. Boyle.

•

P. C. LAUINGER
President

S. H. ROURKE
Executive Vice President

MITCHELL TUCKER
Vice President and Advertising Manager

HANSON B. PIGMAN
Circulation Manager

DONALD W. WILSON
Manager Industry Census Department

J. PARKER HOLLAND
Production Manager

ADVERTISING OFFICES

TULSA
211 South Cheyenne, 3-6291
JOHN D. REILLY . . Mid-Continent Manager

NEW YORK
500 Fifth Avenue, LOngacre 4-6160
CHARLES A. WARDLEY . . Eastern Manager
ROBERT N. CAIRD, JR. . . Representative
JAMES W. BROWNLEE . . . Representative

CHICAGO
105 West Madison Street, CEntral 6-2537
E. S. KLAPPENBACH . Midwestern Manager
DAVID T. KENNEY . . . . . Representative
JOHN D. YODER . . . . . Representative

PITTSBURGH
106 Nelbon Avenue, FRemont 1-7775
ALFRED M. JONES . . . . Manager

HOUSTON
Sterling Building, CHarter 4626
JOHN M. SPEARS . . . Gulf Coast Manager

DALLAS
1238 Mercantile Bank Building, STerling 3074
GEORGE O. RUPPERT . . . Representative

LOS ANGELES
650 South Grand Avenue, VAndike 0772
DONALD O. HANSON . . . . . Manager

ENGLAND
111 Thorley Lane, Timperley, Cheshire,
Phone Ringway 4702
HARRY BECKER . . European Representative

•

Subscription rates to the petroleum industry, United States and foreign, 1 year, $4.00; 2 years, $7.00; 3 years, $8.00. Single copies, 50 cents. Back copies when over a year old, $1.00. Note: Payments from outside the U.S.A. may be in the form of an international money order or check on a U.S.A. bank. Entered as second-class mail matter at Tulsa, Okla., under act of March 3, 1879. Copyright 1955 by The Petroleum Publishing Co.

Member
Audit Bureau of Circulations
Associated Business Papers

JOURNALLY SPEAKING . . .

For the Birds

FROM Sun Oil Co.'s house organ we learn the distressing story of an incessant battle between man and bird in which victory always goes to the feathered species.

It seems that Sun's bulk station on the South Jersey shore is beset by sea gulls. The pesky critters dig clams, oysters, and other Crustacea from the mud flats at low tide, then dive-bomb Sun's big storage tanks. When dropped from sufficient altitude, the shellfish break open on the flat steel tops. Then the gulls swoop down, devour the succulent innards, and leave the shells. They ignore the small tanks which require keener marksmanship, with the result that the two big tanks are always piled high with old shells.

So the warehouseman has to climb up and sweep off the tank tops every couple of days, not only for the sake of neatness but because the weight of accumulated shells might squash the tank. This has been going on for years and years, and nobody has found a way to beat this shell game.

This is a sort of a confession of weakness on the part of Sun, an admission that birds are smarter than it. We would think that such a progressive outfit would assign its research department to develop a technological defense against this aerial invasion. Radar ought to offer some possibilities. Or they could spread mattresses on top of the tanks so the shells wouldn't break and the gulls would starve to death. Or build pointed roofs so the shells would fall off. Or install remote-controlled vacuum cleaners to collect the shells, convey them to a central point, and grind them up for fertilizer. Or something.

On the Half-Shell

SPEAKING of oil and oysters, the the two have been involved in a different sort of battle down New Orleans way. There it's the oysters, not the oil companies, that need protection. (Sea gulls don't seem to be involved in this case.)

Oysters were dying off by the million around the Mississippi Delta. Oystermen blamed the oil companies, figuring that their drilling and producing operations were polluting the oyster beds. So a group of oil companies jointly financed a research project. They went into the oyster business. They raised oysters on diets of oily water, drilling mud, and salt water from oil-producing formations. The oysters thrived. They set off charges of dynamite, simulating seismograph shots, beside their beds. The oysters never blinked an eye (disproving the old notion that a noisy noise annoys an oyster).

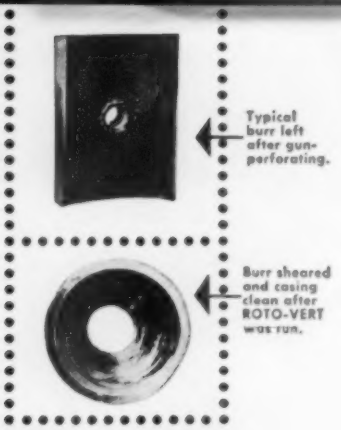
Obviously it took something worse than an oil industry to bother these bivalves. The oil companies were absolved from guilt. But by this time they had spent some $2,000,000 on oysters (oysters Rockefeller?), and had become rather fond of the silly things. They got interested in finding out what really was killing them off.

So they continued research into the love life, care and feeding, psychological complexes, and social environment of the oyster—not because they were obliged to but just because they wanted to. They laid the oyster out on the half-shell and bared his/her innermost secrets (our information doesn't state whether or not they dispelled the general uncertainty regarding the gender of this armored animal). They found that he (she, or it) has a pretty tough time of it, what with being anchored in one spot, and all like that.

It is said that it was a brave man who ate the first oyster, but these oil-company investigators discovered that a great many marine creatures have no hesitancy about gobbling up a "dozen raw." But the worst enemy of all turned out to be a tiny fungus. This fungus likes oysters even better than the gourmets in New Orleans' famous restaurants, and it, not the oil companies, is the main cause of the alarming mortality rate of the Gulf Coast mollusks.

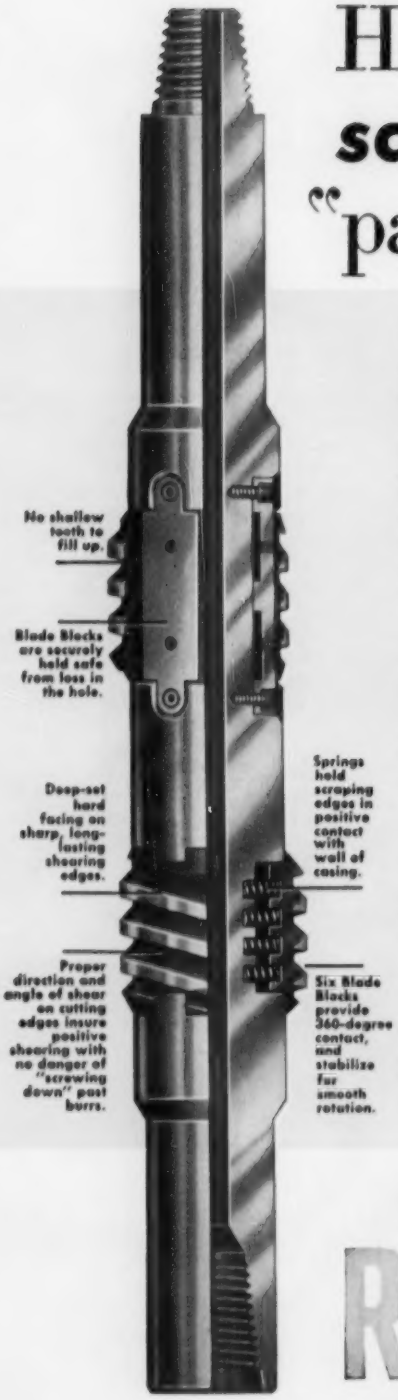
What to do about this fungus is still a problem, but the oil companies are working on it. They have found that, unlike humans, the fungus prefers oysters in months with no "R" in them, and they are trying to use this as a clue to defensive measures. So oystermen are learning that the oil industry, instead of being their worst enemy, is becoming their best friend.

—Henry D Ralph.



Here's why

SCRAPING YOUR CASING "pays off"


No shallow tooth to fill up.
Blade Blocks are securely held safe from loss in the hole.
Deep-set hard facing on sharp, long-lasting shearing edges.
Springs hold scraping edges in positive contact with wall of casing.
Proper direction and angle of shear on cutting edges insure positive shearing with no danger of "screwing down" past burrs.
Six Blade Blocks provide 360-degree contact, and stabilize for smooth rotation.

Unless the inside of your casing—the vital "working surface"—is clean and smooth, there is always a possibility of trouble in future operations. Burrs from gun-shot perforations, hardened cement or mud, and even mill scale are all dangerous when the time comes to run testers or swabs, or to set retainers or packers of any description.

The Baker Model "C" ROTO-VERT Casing Scraper removes undesirable obstructions from the inside of the casing, leaving it clean and smooth. Burrs or imbedded bullets are sheared away; cement, mud and scale are scraped away, so that any down-hole work can be safely done at once, or during the years to come.

SCRAPE WHILE DRILLING OUT

The ideal time to use the ROTO-VERT Casing Scraper is during the drilling out of cement, at which time it is run as a "follow-up" behind the bit. Thus in a single run you can also remove all hardened cement, mud, burrs and scale which might later damage swabs or testers, and cause packers or retainers to set prematurely—or never set at all.

EASY TO RUN—LOW-COST RENTAL

The Baker ROTO-VERT Casing Scraper is simple to run, and will effectively clean the inside of the casing *when either rotated or reciprocated* (vertical action). No service man is required, and the low rental cost is paid for many times over by freedom from future damage to bailers, swab rubbers and packers, as well as by the elimination of future delays and re-running expense.

BAKER OIL TOOLS, INC.
HOUSTON • LOS ANGELES • NEW YORK
Call Baker for consultation and service . . .

BAKER ROTOVERT CASING SCRAPER

PRODUCT NO. 620-C

The gauntlet is down in the gas battle

THE fight to free gas production from federal control isn't half over. In fact, it's just beginning. There can be no relaxing now.

The industry has convinced the cabinet that the law should be amended. Now it has to convince Congress and the general public. This won't be easy.

The cabinet committee's report is a powerful aid. It gives the industry a kick-off point and a rallying banner. But it also serves as a target for the opposition to shoot at. So the battle lines are forming, and the fight will be bitter.

THE TACTICS TO BE USED BY THE OPPOSITION are becoming clear.

The political spokesmen for consumers—many of them self-appointed—will use all the demagog's bag of tricks to defeat the Harris bill or anything like it.

They will picture this as a fight between the poor, common man and the rich, grasping monopolies.

They will attempt to whip up indignation and obscure the issue by catch phrases and half-truths designed to make headlines and catch popular fancy.

They will use the tactic of divide-and-conquer, hoping to split the industry's united front.

The cabinet report will be attacked as "stacked" because some industry men assisted in its preparation and because its conclusions coincide with the traditional position of gas producers.

Exemptions will be offered to small producers with the concession that (for the present) it is enough to regulate only the "seven producers who supply one-third of the gas" or the "100 producers who supply 85 per cent."

A wedge will be driven between pipelines and independent producers by proposing different types of regulation of their gas.

Recent increases in gas prices will be laid to "gouging," with no recognition of the general increases in costs and prices of everything else nor of the relative values of gas and competing fuels.

Bland assurances will be made that regulation will provide for all "legitimate" costs, continue incentives for discovery, and bow to state conservation practices.

AGAINST THIS THE INDUSTRY MUST stick together, and must offset hysterical demagogery with a calm presentation of the real facts and the basic issues.

Squabbles within the industry must not prevent united support for the cabinet recommendations, for if Congress gets the idea that these are not entirely sound, passage of any remedial legislation this year will be almost impossible.

this is my hole card...

The first time I called Anchor I was needing a couple of cars of natural gasoline . . . fast! Anchor had those cars at my plant in record time. The smart way the Anchor team handled my order suggested to me that they might be the folks to not only supply the blenders I regularly need, but also to *market* my surplus petroleum products. So ever since, whether I've needed products or had products to sell, Anchor has been my "hole card" . . . always an Ace.

•

If you have the products, Anchor has the markets. If you have the need, Anchor has the products. Anchor's huge fleet of tank cars, big storage installations and nation-wide team of alert, fast-moving specialists will mean more profits at less effort for you. Call Anchor—Tulsa 2-7261—for the whole story. No obligation, of course.

ANCHOR

PETROLEUM COMPANY • TULSA

SALES OFFICES: Des Moines, Shreveport, Toledo, Houston, Long Beach, Okla. City, Midland, Texas, San Francisco, Fresno, Seattle, Salt Lake City, E. Patterson, N. J., Hattiesburg Miss. Macon, Ga., St. Paul, Minn.

THIS WEEK . . . . . IN THE NEWS

Government

• White House backs away from outright endorsement of cabinet committee's ideas on divorcing FPC and natural-gas producers. Presidential aide calls attention to fact report is advisory group's recommendation and not the President's.

• Opposition develops to sale of synthetic rubber plants to private industry. Texas senators want time to sell Baytown plant not included in the deal.

• Senate vote on quotas for oil imports could be very close. Opposing groups concede it could go either way as Senate nears showdown.

Labor

• Pay demands by recently enlarged C.I.O. oil workers union may be stifled by industry's offer of a general wage increase. Most proposed wage boosts range about 4 per cent, just under the 5 per cent asked by organized labor last year.

Exploration

• Gulf Oil will spud Florida's first offshore test this week. Location is 7 miles at sea, between mainland and Florida Keys. Test is projected to 12,500 ft.

• Oregon, with no commercial oil or gas, is watching a wildcat on the route of the proposed Pacific Northwest pipeline. The shallow eastern Oregon test blew out and unloaded 600 ft. of highly gas-cut mud before it was brought under control.

• Panhandle Eastern has the Hugoton field's first Morrow production. Well is 2½ miles north of Pleasant Valley in southwestern Seward County, Kansas.

Drilling

• A new hard-rock drilling tool may be offered the industry soon. In field tests last week near Los Angeles a rotary-percussion drill was cutting igneous rock and granite at rates often exceeding 30 ft. an hour. Within 48 hours, including down time, the drill penetrated 250 ft. after a conventional rotary unit had spent 3 days drilling the first 30 ft. Drilling was being done with a 30-ft. solenoid-type percussion tool below two drill collars.

• Cheaper drilling is possible if operators do five things, A.P.I. production meeting is told. The five requirements: Give contractors all the information they need; use a standard contract form; standardize blowout-preventer hookups; see that the contractor's rig is adequate; design a mud program for safe drilling as well as control.

Associations

• The A.P.I. Division of Production may divide its southwestern district into two districts. Under the proposal, North and West Texas and New Mexico would form one district. The other would include the remainder of Texas except the Panhandle, Louisiana, Mississippi, and Arkansas.

Pipelines

• American-Louisiana will probably start building its 1,300-mile line from the Gulf Coast to near Detroit this summer. The $130-million project is one of the biggest natural-gas pipelines now pending. Five producers who plan to supply the 30-in. line will seek FPC permission to sell their gas.

• Huge 36-in. pipe will move into the big time this year as Transcontinental lays 315 miles of it in a looping program on its Gulf Coast-to-New York line. Transco also will lay 219 miles of 30-in. in scattered projects designed to increase main-line capacity. Work to begin next month, be finished this year.

• Magnolia will have a second crude line between Midland and Corsicana, Tex., when it completes a 215-mile looping program next fall. The new line will boost the system's capacity from 128,000 to 162,000 bbl. daily.

Corrosion

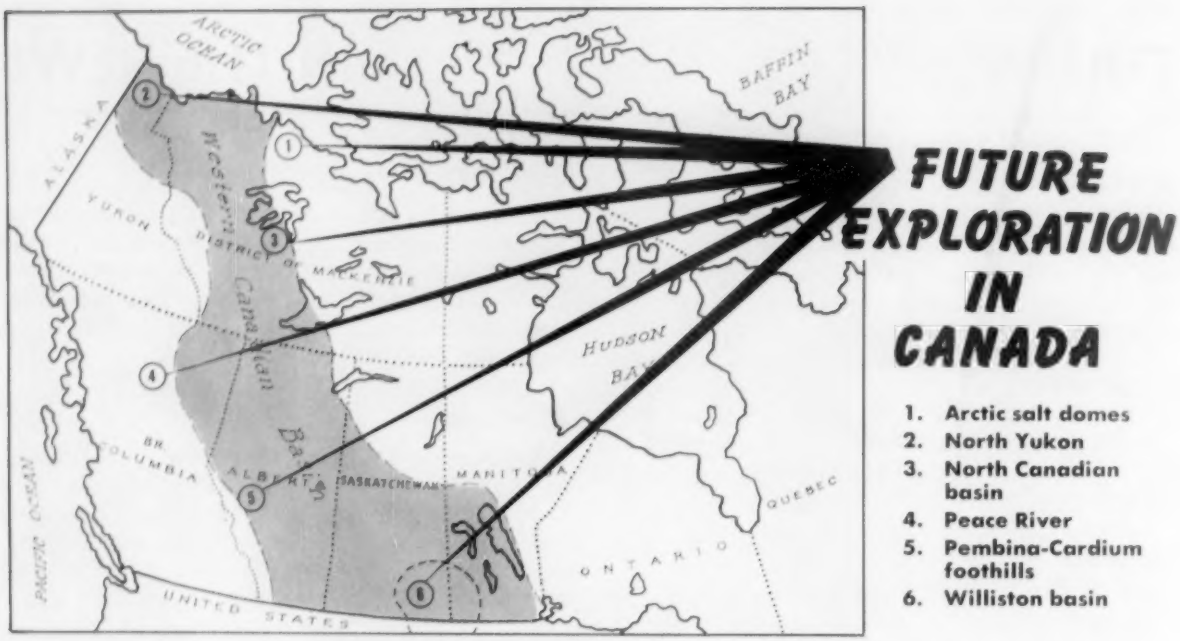
• Letting a little air into refinery vessels will cut corrosion due to hydrogen penetration. Two Shell engineers tell the National Association of Corrosion Engineers that adding just the right amount of air will coat steel with a complex chemical known as polysulfide. Atomic hydrogen cannot penetrate the coating.

International

• A dozen more oil companies bid for a slice of Iran's production. In all, they are seeking about 40 per cent interest. The agreement under which Iran's oil is being marketed provides only 5 per cent for independents.

• Bids for construction of products pipeline serving military bases in Spain will be opened this month. The 600-mile system is to be completed in mid-1956.

• Big Esso refinery in England will boost its production of heavy fuel oil to meet growing demand. In contrast to trend in U. S., Europe's consumption of fuel oil is increasing sharply.



Canada's Future Will Dwarf Her Past

- There are 4,000 proved but undrilled locations and only one wildcat for every 750 sq. miles of sedimentary area

- Only lack of markets, severe weather, rugged terrain keep Canada from grabbing the Twentieth Century limelight

Frank Gardner

CALGARY.—Canada faces a future of oil exploration that dwarfs our present conceptions. It will be vast in its scope and it will cover a long period of years.

The 600,000 sq. miles considered fair game for oil finding in western Canada makes up one of the largest, most promising, and most sparsely tested oil provinces in the world. It is actually a bit ambiguous to speak of western Canada as a single oil province, for here is a vast area of exploration more than twice the size of Texas. With an 800-mile, east-west width and a 1,500-mile, north-south length, this great petroleum prospect stretches from the United States boundary to the Arctic Ocean.

When western Canada and Texas are compared, the differences in exploration intensity become more evident. In 1954, Texas drilled 5,109 exploratory wells with a success ratio of 22.8 per cent. In Canada, in more than twice the area, 936 exploratory wells accounted for a success ratio of 26.7 per cent.

Production growing . . . The important thing to remember about this growing oil empire is that reserve increases are outstripping production. The problem of finding oil is overshadowed by problems of developing what has been found and getting it to market. It has been estimated that more than 4,000 proved locations are yet undrilled. Production can be expected to expand at a rapid rate as outlets and markets appear.

Canadians count on a daily production capacity of 1,000,000 bbl. by 1960, compared to a present capacity of about 400,000 bbl. per day. The country is consuming about 560,000 bbl. daily, and the rate increases by 7 per cent each year. This increase in domestic consumption, plus new markets that are bound to appear, will no doubt lead to a reasonable balance between reserves, production, and markets in the immediate future years. Major oil and gas pipelines built, building, and to be built will ease the problem of outlet and lead to a long period of exploration activity.

Western Canada's 6,000 oil wells are producing 300,000 bbl. per day, and forecasts call for an increase to 330,000 bbl. this year. Last year, the average was 260,000 bbl. daily. Of this, more than 90 per cent comes from Alberta, but Saskatchewan and Manitoba are beginning to emerge as important sources, accounting for rapid increases during 1954. These actual producing figures reflect 75 per cent of the potential producing capacity.

Consider then, that in 1960, if the trend continues, we can expect to see a daily production of 650,000 bbl. daily, nearly equal to total domestic consumption anticipated at that time. One-third of that consumption lies on the eastern Canadian seaboard and will probably not be immediately supplied by western Canadian crude. Consequently, some 215,000 bbl. daily of western oil will have to find export markets in the United States, in the Pacific Northwest and Great Lakes areas. If U.S. consumption continues its increase and greater reserves do not result from U.S. efforts, these markets will no doubt be found with relative ease.

Reserves up . . . Despite the fact that Canada has attracted worldwide interest from the oil and gas industry only in the past 7 years, oil production is not new to her. In fact, there are those who claim that southern Ontario was producing oil in the Lambton area at least a year before Colonel Drake drilled the first U.S. commercial well in 1859.

But major production is new. Light oil was first discovered in major quan-

A JUG HUSTLER in the Canadian bush carries 1,300 ft. of seismic cable on his back.

A CANYON WALL CONTACT of Exshaw shale and Banff limestone makes precarious footing for a Royalite geologist as a measurement is made.

tities at Turner Valley in 1936, and heavy oil at Lloydminster in 1939. Not until the reef discovery at Leduc near Edmonton in 1946 did the actual boom begin. Since then, and especially during the past 4 years, the discovery rate has skyrocketed, and reserves have increased 3,300 per cent since Leduc.

At first glance, these figures are impressive, but when viewed in a world perspective they are extremely modest. Canada's estimated reserve of 2¾ billion barrels represents less than 3 per cent of the world figure. It is about 10 per cent of the North American continental reserve, however. Viewed in the light of what has been done in exploratory drilling, the impact of accomplishment to date and of what remains to be accomplished is electric. Compared to the United States, where 1½ million wells have been drilled, western Canada has seen only 10,000 tests. Today, U.S. interests are sinking 25 tests for every single Canadian. Over the past 10 years, three times as much oil and four times as much gas has been found for every Canadian well as has been found for U.S. wells.

Oil in the economy . . . On a production basis, of course, such comparisons have little meaning, but they do point up the present and future significance of the Canadian oil and gas industry in the world picture. Here is a land with one wildcat test to every 750 sq. miles of favorable sediments. In the United States, the figure is nearer one to every 30 sq. miles. It is easy to see that Canada's maturing oil industry is at a threshold of initial development, and that its future stretches far ahead.

Canada today needs the energy in its oil and gas. She needs it to power a burgeoning industrial development. She needs it for fuel. She needs it for transportation. For agriculture. And for these purposes, she is approaching self-sufficiency. The time will come when she will have a great surplus of oil and gas, but now, the bulk of her production is being used to transform a young country into one of the world's most productive nations.

Canada needs people. To achieve a place in world competition, the hands to do the job are essential. It's a huge country, thinly populated, and trained personnel is at a premium. Only recently, Immigration Minister J. W. Pickersgill emphasized the willingness of his country to welcome young Americans into its agricultural and industrial economy. Canada is interested in the quality of its immigrants in order to best serve her future. She is sending hundreds of young Canadians abroad for training programs in oil and gas, and in other industry. Ironically many of her young men cast yearning glances southward to the U.S. as the proverbial land of opportunity. This trend will reverse as Canadian development approaches full swing. The country has the second highest living standard in the world. Canadians, per person, are the second highest oil consumers in the world, and the country itself is the third largest consumer of petroleum products. One-third of the homes in Canada are oil-heated, and there is one automobile to every four persons, three tractors to every four farms.

Operating difficulties . . . In this dynamic country, one great factor affects every phase of life—distance. Geography has been less kind, it is said, than geology. "No matter where you go, you are much too far from where you've been and from where you'd like to go!"

Slowly, transportation, pipelines, and public works are shrinking these distances to bring the remotest parts of Canada closer to the hubs of activity. Nevertheless, the forces of geography and distance have added obstacles to the development of the oil and gas industry. The severe winters, the short summers, and unpredictable terrain have retarded development of many good oil and gas prospects. Undoubtedly there will always be certain fields that will be shut in for lack of outlet.

Another unfortunate circumstance in Canadian oil development is the increasing difficulty met by the small operator. Land is more closely held than ever before, and few areas can be leased at reasonable price. Quick payouts from flush production cannot be relied on as long as supply exceeds demand, and this condition prevails in many fields. It is hard for the independent operator to hang on and finance new operations. One doesn't speak in terms of 40 acres in Canada—more likely it's 40,000. They think big and they operate big. Every branch of

EXPLORATION parties have rough going in the Jasper area of Alberta. This horse-powered party wends its way 15 miles south of the Brazeau River in the Big Horn Range of the Rockies. (Royalite photo.)

the industry has become more technical, more involved, and consequently more expensive.

Exploration and drilling . . . Development and exploration will go on but at a somewhat slower pace than if a more competitive situation existed. Wildcat drilling is widespread, but numerically it is concentrated in these principal areas:

. . . Peace River region, on the Alberta-British Columbia border. Large gas reserves and some oil have been discovered here. The announcement of the Westcoast gas pipeline to the Pacific Northwest has spurred wildcatting and development in the region. Major oil and gas fields are anticipated.

. . . Northeastern Williston basin, in southeastern Saskatchewan and southwestern Manitoba. Mississippian limestones here have yielded increasingly good fields. The recent feeder pipelines from these fields to the Interprovincial Pipeline encourage additional exploration and development.

. . . Southwestern Alberta, westward from the Calgary-Edmonton highway to the foothills of the Rocky Mountains. Here in the deepest part of the so-called Alberta basin, new interest in deep drilling has been stimulated by flush discoveries in Mississippian limestones at Sundre and at Westward Ho, and by reef discoveries at Sundance, Devonian in age, paralleling the Sturgeon Lake trend to the northwest.

. . . Pembina region, where Cardium oil discoveries have spread over more than 120 miles.

. . . "Foothills" overthrust area, where the Jumping Pound - Turner Valley-Pincher Creek trend is undergoing an extremely hot lease and drill play.

. . . Clear Hills area, northernmost Alberta field, where a recent discovery uncovered the first flush production from granite wash at the base of the Upper Devonian.

With all these prospects before them, Canadian operators are optimistic about the exploration future. At the present time, about 235 rigs are active in the western provinces; 125 are wildcat operations and 110 are on development wells. During the month of January, 59 wildcats and 155 field wells were finished, with success ratios on the wildcats running 27 per cent.

Alberta continues to lead the field with 161 active rigs, with Saskatchewan in second place with 42. British Columbia has 16 rigs running, to Manitoba's 13.

With the spring thaw, drilling activities in many areas must decrease, for mud and muskeg deny access to large parts of the foothills belt in Alberta. Over-all, a mild winter has retarded exploration activities in some of these areas. Indian tribes have predicted another wet summer for Alberta, which if true, would result in another slowdown not unlike the one of 1954, when rains prevented operations for months on end.

The gas story . . . The biggest gas-transmission project in history will result from a three-way agreement signed late last year between Pacific Northwest Pipe Line Corp., Westcoast Transmission Co., Ltd., and El Paso Natural Gas Co.

The big deal will bring Canadian gas into the West Coast areas of the United States. Westcoast Transmission will build 650 miles of trunk line from the Peace River region to Vancouver. A short line is planned to the United States boundary near Sumas, Washington, to deliver 300,000,000 cu. ft. of gas per day to the Pacific Northwest. The Canadian gas should enter the United States late in 1957.

The allocation of markets, supplies, and facilities among the three companies should benefit the entire western half of the United States and Canada. British Columbia will be supplied by its own gas and by American gas in case of line breaks. The rapidly-growing California market will get either American gas or its Canadian equivalent. Westcoast expects to develop markets in British Columbia for between 60,000 and 100,000 M.c.f. of gas per day, initially. Canadian laws governing the export gas leave room for fear that the gas movement might be curtailed or its price increased.

In the Peace River region, development and exploratory activity are expected to increase immediately now that a gas outlet is in sight. Natural gas reserves in Canada are increasing more than 1.5 trillion cubic feet per year. Most of the gas has been produced with oil.

Canada's gas problems will be markets, not reserves. By 1975, the annual gas market will range from 0.4 trillion to 1.2 trillion cubic feet. Canada can expect a lightning-like increase in gas demand as did the United States in recent years. Most of the metropolitan Toronto area is already supplied by gas from the Tennessee Transmission Corp.'s lines.

Western Canada gas should be in eastern markets by the first of 1957. Trans-Canada Pipeline Co. hopes to begin this spring laying a 2,200-mile line from Alberta to Winnipeg (a branch from Winnipeg to Minnesota markets), thence to eastern Canada.

Alberta's gas reserves are estimated at 14.4 trillion cubic feet. The British Columbia side of the Peace River region is estimated to have 3 trillion cubic feet of gas reserves with 2 trillion on the Alberta side. Seven areas at Peace River are proved; the biggest is Fort St. John. Gas reserves in Saskatchewan are estimated at 1 trillion cubic feet.

The outlook . . . The Canadian oil industry has ended a 7-year period of youthful growth, and now stands ready to embark upon a period of maturity and challenge. It has been receptive to U.S. exploration ideas and has studied its neighbor's oil history closely, taking advantage of its experiences, avoiding its pitfalls, and adapting its best features. Now it must fight for position in the competitive world market. It must look to conservation, and seek improved production practices. It must avoid infringement of basic freedom of enterprise by governmental agencies, now threatened in some quarters for the first time. And it must

overcome physical and geographic handicaps that are peculiar to the country itself.

Rough terrain, unyielding weather, and the hazard of vast distances and remote theaters of operations present obstacles not encountered in other oil countries. But this will not deter exploration. Oil finders will push to the far corners of the country in their search. Right now, exploration concessions on the borders of Alaska in the Yukon country and in the Northwest Territories are being shot and surveyed. Dawson City is one of the most active geophysical concentrations on the continent. Wildcat wells are being drilled in locations that would have baffled the best explorer 10 years ago.

As development of proved pools takes place, production can be expected to spiral, and doubtless the 1,000-,000-bbl.-a-day target will be reached within 5 years. The market problem will resolve itself, piecemeal, as the pressure of production increases, and it is not inconceivable that the Interprovincial Pipeline will be pushed eastward to Toronto and Montreal, especially if the Saskatchewan and Manitoba reserves continue their present rate of growth. These two provinces are much nearer the eastern market, now untouched by domestic supply, than Alberta. The temptation to capture the market will grow with added new development of reserves. This market alone would permit an increase of 70 per cent over present production rate.

Pipeline and refinery construction will continue to increase as the fields of the west and northwest continue to grow in importance. The discovery of fields like Pembina, Sturgeon Lake, and Clear Hills will stimulate the need for more and more feeder lines. History has clearly demonstrated the clear pattern of discovery leading to overproduction leading to solution of the problem through construction. Refining capacity in 41 plants was expanded to 583,000 bbl. per day in 1954, and projects now under way will add another 50,000 in 1955.

The industrial expansion of the country is destined to be "continuously phenomenal." Twenty-four petrochemical plants have a value of $275,000,000 and they are growing fast. One new plant has been announced for 1955 construction in the Winnipeg area, and another at Medicine Hat.

Canadians believe that the 20th century belongs to them. If it is a little late for the United States to concede it to them, at least she is destined to share the last half of it. And it is to advantage of the United States to lend every helping hand if it is to achieve the oil independence that may be vital to survival in another major war.

Standard of California to Test Limits of Jones Pool

Standard Oil Co. of California will drill nine wells from these and other beach sites adjacent to the townlot drilling boom under way in Huntington Beach. From these surface sites at the foot of Tenth Street and seaward of Ocean Avenue, the wells will be bottomed to drain oil from the Pacific Electric right-of-way, on which Standard holds a lease. The first well was spudded last week. Its outcome will give a better indication of how far the Jones pool extends under the state-owned beach and tidelands. Last week 40 rigs were at work in a 20-block area of Huntington Beach.

Westcoast Buys Gas

CALGARY.—A 20-year contract for 8,000,000 cu. ft. of gas daily for the Westcoast Transmission Co. line has been signed with Pathfinder Petroleums, Ltd., Legion Oils, Ltd., Canadian Admiral Oils, and Gas Exploration Co. of Alberta, Ltd.

The contract price is on a sliding scale, ranging upward from 10 cents initially to 12½ cents per M.c.f. in the twentieth year.

The contract, signed with Westcoast's subsidiary, Westcoast Transmission Alberta, calls for delivery to begin after January 1, 1958. The Pathfinder group will build its own gathering and gas-cleaning facilities.

The gas will come from reserves in the Pouce Coupe area of Northwest Alberta, near the British Columbia border.

Holdings of the group include 16,082 acres of crown leases and 17,280 acres of gas-license lands.

Pipeline Loan Denied

OTTAWA.—Canada's Industrial Development Bank does not have the power to lend money to a gas pipeline.

James Coyne, governor of the Bank of Canada, made the statement when asked recently if the Development Bank was considering a $3,000,000 loan to Trans-Canada Pipe Lines, Ltd.

Feeder Lines Authorized

CALGARY.—Alberta Gas Trunk Line Co., Ltd., has been given the green light by Alberta's Petroleum and Natural Gas Conservation Board to lay feeder lines from six fields to its main trunk line.

The lines will link Sunnybrook, Cessford, Steveville, Provost, Sibbald, and Pincher Creek with the trunk line.

Lines from Sunnybrook, Cessford, and Steveville will connect with the trunk in the Princess area. The Provost line will run south to link with the main line about 20 miles west of the Alberta-Saskatchewan border. The Sibbald lateral will connect with the Provost feeder, and the Pincher Creek line will join the trunk line in the Bassano area.

Alberta Gas Trunk Line will gather gas and deliver it to the huge west-to-east line planned by Trans-Canada.

Crude Postings Advanced

CALGARY.—Imperial Oil, Ltd., has increased its crude postings for three Alberta fields. Good quality of the crude was given as the reason.

Crude from Duhamel D-2 and D-3 zones was raised 6 cents to $2.47 a barrel. Lower Cretaceous and D-2 oil in Malmo field was raised 3 cents to $2.51, and D-2 crude in New Norway was raised 3 cents to $2.54.

Air Cuts Corrosion

Shell finds controlled air injection protects walls of refinery units from failure due to hydrogen penetration

G. L. Farrar

CHICAGO. — Bleed a little air into your refining equipment — it may save you some money.

This is one way to cut down on corrosion due to hydrogen penetration of steel, W. A. Bonner said here last week. He and H. D. Burnham, both of Shell Oil Co.'s Wood River, Ill., refinery, authored a paper which Bonner presented at the annual meeting of the National Association of Corrosion Engineers.

Hydrogen sulfide reacts with steel at atmospheric temperatures to produce atomic hydrogen at points where water collects. The atomic hydrogen builds up on the surface, and some of it diffuses into the steel. It collects in small defects in the steel wall and combines to form molecular hydrogen.

In alkaline systems without air, this process continues until blisters and fissures form in the steel. These finally lead to failure of the equipment.

Other methods tried . . . Coatings tried in one refinery failed to prevent penetration of atomic hydrogen into steel.

Expendable steel liners successfully protect steel vessels, but they cost too much to install and replace.

Cement-type linings are readily applied and furnish good protection for large equipment. But they can't be used for pipes and condensers.

Commercial inhibitors failed to halt the penetration.

Adding just the right amount of air works because some of the hydrogen sulfide reacts with it to form a coating of a complex chemical known as polysulfide on the steel. Atomic hydrogen cannot penetrate it. This chemical change takes place in slightly alkaline water solutions.

No effect on products . . . Air addition has no effect on quality of refinery products. Gum content of gasoline produced during air addition is no higher than that made before air was admitted. Tests on other products show no change in specifications.

This method was worked out at Shell's Wood River refinery. It has been used for 2 years, and none of the units protected in this manner has shown any evidence of hydrogen penetration.

Test results were determined by using a hydrogen-penetration probe. This device is a short, thin-walled steel pipe with valve and gage. It is placed in the vessel to be tested. If hydrogen penetration occurs, pressure as measured by the gage increases.

Things to watch for . . . There are several things to watch for if this method is to be successful:

. . . Addition of air or oxygen must be carefully controlled. Requirements should be carefully determined, based on hydrogen sulfide concentrations. Too little air will allow some corrosion, and too much air causes hydrogen penetration to start again. This is due to other reactions that occur with the excess oxygen.

At the Wood River refinery, air is added to the cat-cracker gas-recovery system at the rate of 0.2 s.c.f.m. per million s.c.f.d. of gas. Air rate in the gas-recovery system from thermal cracking is 0.15 s.c.f.m. per million. s.c.f.d. of gas.

Requirements will vary with the processing situation.

. . . The polysulfide protective coating must be formed in slightly alkaline water solutions. Below pH of 7.8, some hydrogen penetration occurs. Above pH of 8.3, troublesome deposits of other chemicals occur. Ammonia is used to adjust the alkalinity within this range.

. . . A small water wash is needed to remove ammonium thoicyanate, a chemical formed during the reaction. If not removed, this material will clog flow lines and cause corrosion. Washing with 3 to 5 g.p.m. of water is sufficient in one of Shell's absorption columns.

. . . If cyanides are present, more air is required. Polysulfide reacts with the cyanides, and the amount of polysulfide removed must be replaced.

Workover Cost Cut

Permanent completions save up to 40 per cent

NEW ORLEANS. — Compared to conventional methods of reworking wells, permanent-type completions saved Humble Oil & Refining Co. 40 per cent in 1954.

This disclosure was made by T. A. Huber and G. H. Tausch of Humble, Houston, at the A.P.I. production meeting here last week.

The areas in which this comparison was made contained both deep and shallow wells. Some of the wells were on shallow-water locations where barge rigs must be used in workovers.

The savings stemmed mainly from the fact that the tubing is not pulled

Storage Tank Soon Will Be a Research Laboratory

One of the industry's most unusual labs is nearing completion at Ponca City, Okla. Continental Oil Co. is converting an 80,000-bbl. storage tank into a three-story "office" building. The doughnut-like building will have lab rooms and offices around the perimeter, leaving a hole in the middle. The lab is faced with aluminum siding and will be insulated and air-conditioned. It will house 60 scientists and technicians. Continental expects the structure to be ready this summer.

from permanently completed wells during workover. The remedial work is done with wire-line tools through the tubing. Therefore, no rig is needed.

New tools and techniques . . . The Humble engineers also told about some new developments in the permanent-type completion equipment. One new development is a gamma-ray and neutron logging device that has an outside diameter of only 1¾ in. This tool, of course, will pass through the tubing.

In field trials, the new logging tool has shown an almost exact correlation with the standard, large-size tool run in casing. According to Huber and Tausch, the new logging tool has enabled engineers to keep a close watch on the level of reservoir-fluid contacts.

The tubing-type perforator, which made a permanent-type completion possible, is still being improved. The recently released "swing-jet" gun was the first big advance. Huber and Tausch said a new perforator with fixed jets promises even better penetration.

Removing cement . . . One thing has scared some operators away from the permanent-type completion. That is the idea of being unable to drill cement with a bit. Humble seems to have overcome this problem.

Huber and Tausch said their company has removed cement by dissolving it with inhibited mud acid. To do this, steel extension tubing with telescoping joints was run in the hole. Then, the acid was pumped against the cement with a swirling motion. With 500 gal. of mud acid, operators can remove 25 to 30 ft. of set cement in 5½-in. casing.

Quick workover . . . Some workovers on permanently completed wells have taken as little as 24 hours. According to Huber and Tausch, as field personnel pick up experience, 1 to 2-day workovers should become routine. They expect that it will soon be possible to do a complete workover for as little as $1,000.

Humble believes the cost of workover operations can be reduced by unifying the various operations. Therefore, the company built a truck-mounted unit which carries all the equipment needed for a complete workover.

More than a dozen wells have been reworked without killing them with mud or salt water. Huber and Tausch reported that it has been possible to run extension tubing, cement, and then remove the extension with as much as 1,300-psi. surface pressure.

The Humble engineers also said that using salt or calcium chloride water makes it possible to rework abnormal-pressure wells without contaminating the formation.

Engineers report on plastics:

Line Pipe Has the Best Record

CHICAGO.—Plastics can be used successfully in oil production, but they will have to be improved before they are used widely. Most successful use so far is line pipe; plastic tanks and in-hole tubing have not stood up well.

These conclusions were outlined by W. M. Thornton, Atlantic Refining Co., Dallas, at the National Association of Corrosion Engineers meeting here last week. B. W. Bradley, Shell Oil Co., New York, was coauthor of the paper that presented findings of N.A.C.E. committee T1-J, on oil-field structural plastics.

Line pipe . . . The committee received reports on 73 installations using extruded thermoplastic line pipe, which softens on heating. Of the 73, one used polyvinyl chloride pipe, 20 used styrene co-polymer, and 52 used cellulose butyrate pipe. More than 110,000 ft. of pipe were used on these lines.

Twenty-four of the lines had one or more failures, usually during the first few days of operation. Nineteen of these 24 were successfully repaired and returned to service. In only five cases were failures so serious the line could not be repaired.

Causes of the failures were: misapplication by users, 2; excessive temperature or pressure, 10; and faulty manufacture, 12.

The committee reported 21 lines made of thermosetting plastic. This material hardens on application of heat and pressure and then remains permanently hard. These lines represent more than 25,000 ft. of pipe.

Twelve of the lines had failures, due mainly to excessive temperatures and pressures. The nine lines which had no failures were operated below 60 psi. pressure and at atmospheric temperature.

In-hole tubing . . . The committee reported on 12 installations where plastic tubing was used in wells. There were failures in six, as follows:

. . . Extruded thermoplastic—used as tail pipe in pumping wells for three installations, with two failures; used as induction string for salt-water-disposal well once, with one failure.

. . . Reinforced thermosetting — used as tail pipe in pumping well in one unsuccessful installation; used as induction string for salt-water disposal seven times, with two failures.

Plastic tanks . . . The committee received information on 11 plastic tanks. The oldest had been in service for only 1 year; 6 had been used 10 months; 2, only 1 month; and 2 others were under construction.

All of the tanks are still in service. But their owners indicated that changes are occurring which may lead to failures. Measurements made on two of the tanks show continual deformation which, if it continues, will cause serious loss of strength.

New Drill Tested

Developers say it's cutting hole where rotaries failed

LOS ANGELES.—The new electrical rotary-percussion drill developed by American Percussion Tool Co. was performing satisfactorily on its first field test last week.

A 14¾-in. hole had been cut to more than 250 ft. The experimental tool had been continuously in the hole for more than 48 hours. It had operated continuously for as much as 3 hours. Some difficulties were met but for the most part they were in the nature of "bugs," shorts, etc.

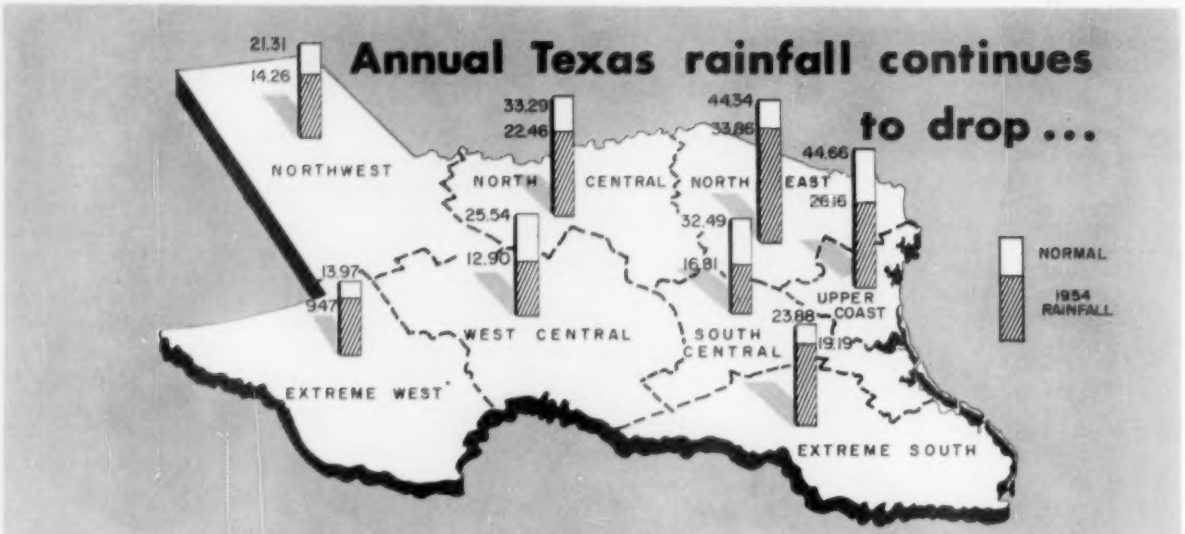
The first test is to drill a water well to a depth of 500 or 1,000 ft. The site chosen in Simi Valley was selected so drilling would be through steeply dipping igneous or granitic rock. As an example of the hard digging involved, the tool's developers said 3 days were required to rotary drill the 30 ft. of top hole needed before the percussion tool could be used.

Choice of action . . . Farther down the hole, "where rotary drilling made no progress," the tool was able to drill at a rate in excess of 30 ft. per hour, they declared.

The interval 213 to 230 ft. was drilled in 30 minutes. This was done using bit weights of 5,000 to 10,000 lb. and rotating speeds of around 200 r.p.m. All drilling was with mud. No effort had been made to air drill.

Using conventional rotary equipment the solenoid-type percussion tool, 12¾ in. by 15 ft., was placed just above the bit and below two drill collars. Controls permitted use of either rotary action only or a rotary-percussion action.

American Percussion has not released data on the tool's operation, other than that length of stroke is in the range of thousandths of an inch and that frequency is about 1,800 strokes per minute *(The Oil and Gas Journal, January 3, page 119)*.



DIVISION		STATE (Weighted)	NORTH WEST	NORTH CENTRAL	NORTH EAST	EXTREME WEST	WEST CENTRAL	EXTREME SOUTH	SOUTH CENTRAL	UPPER COAST
1952	Rainfall	22.94	13.65	26.53	40.75	9.13	24.74	14.61	31.40	43.15
	Departure from normal	-4.76	-7.66	-6.76	-3.59	-4.84	-0.80	-9.27	-1.09	-1.51
1953	Rainfall	23.72	15.77	29.73	49.13	5.97	19.14	17.76	28.67	46.41
	Departure from normal	-3.96	-5.54	-3.56	+4.79	-8.00	-6.40	-6.12	-3.82	+1.75
1954	Rainfall	18.30	14.26	22.46	33.86	9.47	12.90	19.19	16.81	26.16
	Departure from normal	-9.40	-7.05	-10.83	-10.48	-4.50	-12.64	-4.69	-15.68	-18.50

Texas Processors Keep Eyes on Water

- State's annual rainfall declined 20 per cent over the last 5 years and water tables have dropped, too
- Some adaptable plant operators are using unusual sources of cooling water because it is best available

F. Lawrence Resen

HOUSTON—Water, the bloodstream of the oil industry's processing plants, is getting some transfusions, Texas-style.

Without water, industry can't exist and the oil industry is no exception. It is engaged in a never-ending search for new sources of process water. This hunt has been hampered in Texas by a noticeable lack of cooperation of Mother Nature.

Declining rainfall in Texas has compelled some plant operators with special problems to look to some unusual sources for cooling water. Unless the rainfall trend reverses, others could find themselves doing the same thing.

Some of these novel uses of available water include:

. . . **Sea water** used for cooling purposes by Dow Chemical Co. at Freeport, and Renwar Oil Corp. at its Mustang Island separation plant.

. . . **Sewage plant** effluent from Big Spring used by Cosden Petroleum Corp. for its refinery in arid West Texas.

. . . **Separator water** from Seven Sisters field used by Goliad Corp. for its Hagist absorption-distillation plant.

The problem . . . The average rainfall in Texas has declined about 20 per cent in the past 5 years. This general drouth condition means less surface water. It has been so prolonged, there has been a decided drop in the water table throughout the state. This strikes at the heart of the state's principal source of oil industry process water—subsurface sources.

Last year, the average weighted rainfall for Texas was 18.30 in., a drop of 34 per cent from the normal 27.70 in. The most critical feature of this 5-year trend has been the shift of the drouth line to the east into the normally wet part of the state. The drouth was anticipated in West Texas last year, but South Central Texas saw its rainfall cut almost in half—16.81 in., a drop of 15.68 in. from normal. The Upper Coast, the area of heaviest rainfall, dropped from its normal of 44.66 in. to only 26.16 in., a decline of more than 41 per cent. Other parts of the state experienced the same thing.

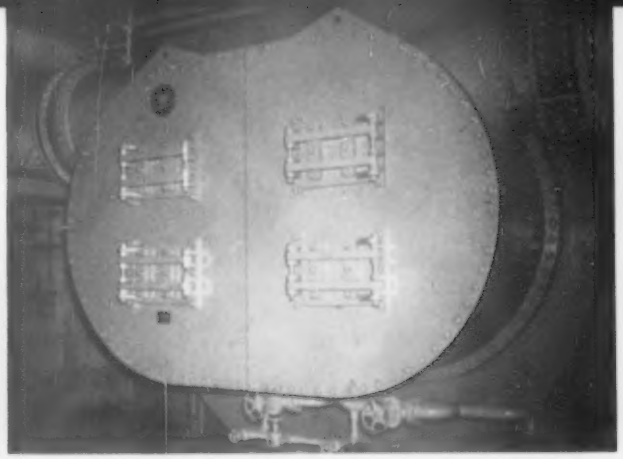
This has meant a tremendous increase in agricultural use of the water that is available. It has also made the citizens in water-short communities cast suspicious eyes on industrial use of a limitied water supply. Any increased industrial use under these circumstances can fan the spark of suspicion into a blaze of protest.

Fortunately for the processing industry, this has not yet become a major problem. Most processing plants in Texas depend on water sources other than public supplies. Most of this water is from subsurface sources and is supplied by wells drilled by companies which operate plants.

In most areas operators are keeping a watchful eye on dropping water tables. Pumps have been lowered to follow the dropping water level in some areas. In others, cautious plant operators have already found supplemental water supplies against the day when they may be needed.

Industrial water is not yet a critical problem in Texas except in isolated

SUCTION PIT furnishes salty process water at Renwar Oil's separation plant.



SEA WATER cools this power plant condenser at Dow Chemical Co.'s Freeport, Tex., plant. Note the 42-in. lines.

areas. But if the rainfall trend continues it could be.

This has made the industry more water conscious. Some operators with good water supplies are cutting corners to save that supply. Some are using as little water as possible in the operation of plants, making use of air or surface cooling in all equipment possible.

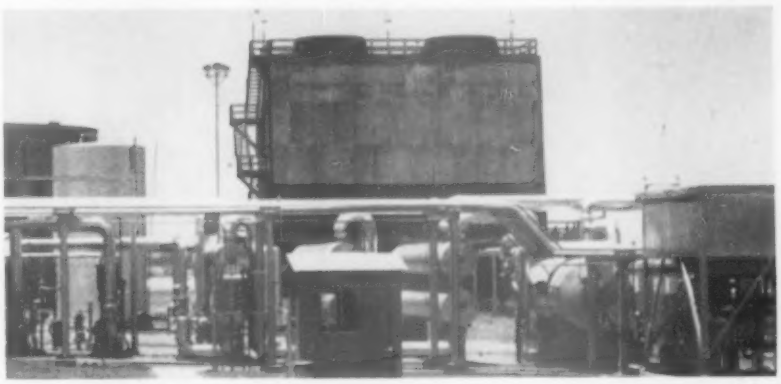
How Hagist operates . . . The lesson Goliad has learned at Hagist might well be adopted by others looking for cooling water.

Goliad has just completed a year's successful operation using separator water that oil-field operators were taking great pains to send back underground. It took a specially-constructed and treated cooling tower to do it, but without it, the Hagist plant in parched Duval County might never have gone into operation.

Water once pumped into an underground disposal well in Seven Sisters field is now piped 3 miles to the plant and used for process water. The water has a high chloride and high bicarbonate content, 1,629 and 2,478 p.p.m., respectively. This made it too costly to treat with sulfuric acid. Total solids run 5,150 p.p.m. and the water has a pH of 8.4.

A concrete tower was ruled out because of costs and a wooden tower, specially built and treated for the severe service, was selected. The tower is an induced draft unit with an atmospheric section containing open coils. Pine was creosoted and impregnated under pressure and then protected with a special tar coating. This wood was used for the main supporting members as well as the internal fill. The exterior of the tower was enclosed with a flat transite siding and the water turned into the system.

Dow's sea water . . . The use of sea water has its problems. Dow uses Gulf water to cool condensers and all processing units where fresh water would normally be used. One of the first problems was the growth of sea organisms. Chlorine injection solved this one.



OIL-FIELD SEPARATOR WATER is used in this cooling tower at Goliad Corp.'s Hagist plant in South Texas.

Wood, as in Goliad's tower, needed protection. It is impregnated with pentachlorophene or creosote. A heavy coal-tar coating is used for mild steel. Magnesium anodes solved what would normally be one of the biggest problems—cathodic attack.

Renwar's use . . . On a much smaller scale, Renwar uses salt water in its separation plant on Mustang Island off Corpus Christi. An atmosphereic cooling tower uses salt water for cooling both the interstage gas flow and the closed circuit cooling water. A suction pit was dug on the bay side of the plant and two pumps pick up the water and spray it over the tower. The water is discharged some distance away. The big difficulty here has been in corrosion of impellers on the pumps. They have a life of about 6 months and then have to be replaced.

Salt water may be more widely used after more research on the use of ion-exchange resins to de-salt water and eliminate salt encrustations on equipment. Unlimited supplies of salt water along the heavily industralized Gulf Coast makes use of this water an attractive proposition once its problems are simplified.

Cosden . . . At Big Spring, Cosden was faced with a limited water supply which was hard and formed scale on equipment. The company made a contract with the city for sewage effluent with specifications on biological-oxygen-demand and suspended solids concentration.

The water is carefully treated before beinng used for plant makeup. One difficulty has been with ammonia carrying over into the steam in spite of the hot process lime treatment used on the water before it enters the plant system. This makes it impractical to use standard bronze trim in valves or pumps. Iron or stainless steel trim is used for equipment in either water or steam service.

A companion problem is the need for constant water analysis. This is especially necessary when chemicals are dumped into the sewage system. The increasing use of household detergents has increased this problem.

In spite of the difficulties involved Cosden has used the water source for more than 10 years—and does so without touching a water supply which might be wanted by someone else.

Refinery Workers' Pay Is Increasing

Wage Hike Spreading

Jersey Standard's offer of 10 cents an hour sets pattern for industry's fifth wage hike since start of Korean War

TULSA.—A general wage increase for oil workers—the fifth in less than 5 years—spread across the country last week.

Pay boosts offered by both independents and majors averaged about 4 per cent, or 10 cents an hour. The pattern was set a week earlier by Standard Oil Co. (N. J.).

Many company officials predict the new pay scale soon will affect practically all wage earners in the industry. Some firms hadn't announced offers by the week end, but most of them were getting ready to resume negotiations.

Management's offer may nip in the bud any new pay demands contemplated by the Oil, Chemical and Atomic Workers International Union (C.I.O.). This organization resulted from the merger of Oil Workers International Union and the United Gas, Coke and Chemical Workers *(The Oil and Gas Journal, March 7, page 78).*

The union's policy committee, meeting soon after the merger, said locals should "seriously consider" asking for new wage hikes this year. It urged locals which hadn't agreed on 1954 contracts to seek at least a 5 per cent increase in pay, or about 11½ cents an hour.

The wage hikes in most cases went into effect immediately for nonunion workers, and similar offers were made to organized labor. Some independent unions accepted at once. Many C.I.O. and A. F. of L. locals scheduled meetings to discuss the offers.

Wage spiral . . . Refinery employes, already the highest paid industrial workers in the country, would average about $100.74 a week under the new pay scale. Next highest weekly pay scale, according to latest figures from the United States Department of Labor, is the $95.47 paid by manufacturers of tires and inner tubes.

Workers in petroleum and natural-gas production averaged $91.30 a week in November 1954, latest month for which official figures are available. A 4 per cent raise would boost this figure to $94.95, or just a few cents short of the highest pay received in nonpetroleum industries.

The new wage hike, if accepted unanimously, would cost the petroleum industry about $1,700,000 a week for the 289,000 production workers and 135,000 refinery workers in the U.S. This total does not include additional wages for pipeline employes, clerical workers, and others not listed separately in the Labor Department census.

The oil industry has given four other general wage hikes since outbreak of the Korean War in June 1950.

Refinery workers then averaged $76.82 weekly. A 4 per cent general increase now would boost the new average to more than 31 per cent above the June 1950 figure.

The raises started in the fall of 1950 when most companies granted a 6 per cent increase. This brought the refinery worker's average to $81.64 in November of that year. In July 1951, his wage rose to $87.78. Following another rise in the wage scale, the average went up to $91.94 in September 1952. Another 4 per cent increase went into effect in the summer of 1953, and the rate went up to $95 weekly. A gradual upward trend since then brought the average up to $96.87 last November.

The current round of wage increases was started by Standard Oil Co. (N.J.). Similar offers were made within hours by Humble Oil & Refining Co., Continental Oil Co., and Standard Oil Co. (Ind.).

One of the first big unions to accept the new pay rate was an independent representing more than 4,000 workers at Humble's Baytown, Tex., refinery.

West Coast companies were closely watching developments east of the Rockies. Wages set in the East and Mid-Continent usually are met within a few months by West Coast operators. Humble's offer already has been extended to California.

At Ferndale, Wash, employes of General Petroleum Corp.'s new 35,000-bbl. refinery voted to affiliate with the C.I.O.

Here's the status of some other major companies:

. . . Esso Standard Oil Co. offered in-

crease of about 10 cents an hour. Offer was accepted by virtually all unions concerned, mostly independents. It will cover workers at five major East Coast refineries, 11 sales offices, and Pittsburgh grease plant. Most salaried workers got raises of about $17.50 a month.

... **Socony-Vacuum Oil Co., Inc.,** is following trend, but bargaining is on local basis. Company reports it's too early to tell how many unions will accept. Some locals, including C.I.O. groups in Midwest, were asking more than 4 per cent.

... **Sinclair Oil Corp.,** only company to bargain on national basis, is "studying the situation." C.I.O. represents 8,000 to 9,000 of Sinclair's 23,000 employes.

... **Phillips Petroleum Co.** offered boost of about 4 per cent. New scale went into effect March 1 for most salaried employes.

... **The Texas Co.** made similar proposal to workers east of Rockies. It is awaiting action of C.I.O., which represents workers in most refineries.

... **Magnolia Petroleum Co.** granted 4 per cent increase effective March 1 to nonunion members, is negotiating with unions, including C.I.O. and A. F. of L.

... **Atlantic Refining Co.** offered 10 cents per hour, which was accepted by most independent unions involved. Workers at Port Arthur refinery are in C.I.O. and A. F. of L.

... **Gulf Oil Corp.** has not disclosed offer, if any, but it is expected to follow trend.

... **Shell Oil Co.** offered 10 cents per hour to workers in Deer Park, Tex., refinery. Negotiations likely will start elsewhere.

... **Standard Oil Co. of Texas** closed contract last week with A. F. of L. group at El Paso refinery. Agreement involved no wage increase.

... **Service Pipe Line Co.** followed trend with offer of 4 per cent, effective immediately for nonunion workers.

Line Raises Octane Rating

TULSA.—A minimum octane rating of 97 was set last week for premium gasoline moving through the Oklahoma Mississippi River Products Line.

The pipeline company set the minimum for regular-grade gasoline at 86 octane. The specification for premium is 3 numbers higher than the new minimum of Great Lakes Pipe Line Co. announced a week earlier *(The Oil and Gas Journal, March 7, page 83).* Sunray Oil Corp. is the principal user of the line.

It was understood the new specification is due to competition for markets along the Mississippi.

Big Line's Start Near

American-Louisiana should lay first pipe on 1,300-mile, big-inch gas line this summer; FPC hearing set April 18

DETROIT.—Construction will probably begin this summer on one of the biggest natural-gas pipelines hanging fire—American-Louisiana Pipe Line Co.'s 1,300-mile, big-inch line from Louisiana to near here.

The 30-in. line received conditional Federal Power Commission approval in October, but was delayed by a court protest filed by Panhandle Eastern Pipe Line Co. *(The Oil and Gas Journal, December 13, page 88).* The Philadelphia Circuit Court of Appeals rejected Panhandle's plea to nullify the approval recently, eliminating the major hurdle standing in way of construction.

The only other obstacle—and its minor compared to the Panhandle protest—is getting FPC approval for producers to sell gas to American-Louisiana for interstate sales. Five companies have filed applications with the agency seeking this approval. They have agreed to supply what would be in the neighborhood of 310,000 M.c.f. daily over a 20-year period.

The FPC last week set the producers' hearing for April 18. If the producers get approval to sell their gas, American-Louisiana should start construction within a few weeks.

According to the company's original application, the producers that have filed applications to supply gas for the line are:

... **Superior Oil Co.,** 1,218,438,000 M.c.f. during the life of reserves of Deep Lake and Constance Bayou fields in Louisiana and Blocks 71 and 76 off Vermilion Parish and Block 149 off Cameron Parish. This is more than half the 2,242,431,000 M.c.f. pledged by the five producers.

... **Stanolind Oil & Gas Co.,** 386,723,000 M.c.f. over a 23-year period.

... **Stanolind, British-American** Oil Producing Co., and Kerr-McGee Oil Industries, Inc., 264,960,000 M.c.f. over 23 years.

... **Texas Gas Transmission Co.,** 372,310,000 M.c.f. over 20 years.

Two other producers, Gulf Refining Co. and Humble Oil & Refining Co., once agreed to sell the line 671,630,000 M.c.f. during the life of reserves in Louisiana's Krotz Springs field, but backed out on the deal. They refused to file for an FPC permit to sell the gas. Gulf and Humble acted when the controversy over the FPC's Order 174-A was at its height.

The other producers had not applied for the FPC permits when the project came before the commission for approval. This led the commission to split its vote on the pipeline when it was approved *(The Oil and Gas Journal, October 11, page 103).* The dissenters argued the commission needed the producers' applications before they could approve a project under the new powers obtained from the Phillips case.

Plans for system . . . The $130 million project will probably be the biggest started this summer. Pacific Northwest Pipe Line Corp. and Trans-Canada Pipe Lines, Ltd., both have bigger lines planned, but neither will probably be started before American-Louisiana.

The American-Louisiana line will be 30 in. in diameter from North Tepetate, La., to near Detroit. A 117-mile, 22-in. line is planned from near Payne, Ohio, to the Bridgman, Mich., area. The line will have an initial capacity of 300,000 M.c.f. daily.

Michigan-Wisconsin Pipe Line Co. and Michigan Consolidated Gas Co., both affiliates of American-Louisiana, will be the line's only customers. Michigan Consolidated will receive 200,000 M.c.f. daily and Michigan-Wisconsin 100,000 M.c.f. daily.

All engineering has been completed and financing arranged. Two insurance firms have agreed to handle $95,000,000 of the financing. The remaining $35,000,000 will be handled with comman stock sales.

T.G.T. line . . . Texas Gas plans to supply 51,000 M.c.f. daily to the line through a connection near Slaughters, Ky. Texas Gas plans to loop 48 miles of its system between Slaughters and Memphis to handle the gas. Compressor facilities at one of its stations also will be boosted as part of the project.

All other gas will come primarily from Louisiana fields. A 12-in. lateral is planned from Lowry, La., where the Superior gas will enter the line, to Cameron field, where much of the Stanolind-British-American-Kerr-McGee gas will be produced.

Panhandle protest . . . Panhandle attacked the American-Louisiana on 30 points, but the charges centered around creating a "monopolistic program" in the Detroit area and in the absence of proof of a "lawful' gas supply. Panhandle's main transmission line runs into the Detroit area from the Hugoton field in Kansas, Oklahoma, and Texas.

Looping Project Ready to Go

HOUSTON.—An $83,000,000 looping project involving 315 miles of 36-in. pipe will be started next month by Transcontinental Gas Pipe Line Corp.

The project, approved last week by the Federal Power Commission, moves the super-inch pipe from a trial status into the pipeline-construction picture in a big way.

Until now only 57 miles of 36-in. has been laid. Ten miles of this was an experimental project in California, not in main-line service. The other 47 was only recently put in the ground by Transcontinental on its 1,840-mile line.

In addition to the 36-in. pipe, Transco will lay 219 miles of 30-in., and 46 miles of smaller pipe. The looping program also will include additional crossings of the Potomac and Savannah rivers and construction of new compression stations near Houston and Lake Charles.

The huge expansion program will increase Transco's capacity by 130,000,000 cu. ft.—to 695 million daily. With deliveries from storage, peak-day capacity will reach 830,000,000 cu. ft. daily.

Contracts have not yet been let, but construction is scheduled to begin in April and be finished this fall. The program will involve 23 separate construction projects in 11 states along the Texas-New York route. Work on the different segments will proceed simultaneously.

The project will enable Transco to increase deliveries to 48 utility, industrial, and municipal customers. Biggest increase will go to Public Service Electric & Gas Co. in New Jersey, which will raise its purchases from 74 to 99 million cubic feet. United Gas Improvement Co. in Philadelphia will get an additional 15 million, and Piedmont Natural Gas Co. an additional 12 million.

Transco announced plans for looping its long line late in 1953 *(The Oil and Gas Journal, November 30, 1953, page 49)*.

The company just finished a looping project in which it used 47 miles of 36-in. pipe. This pioneering project proved that the big pipe will move 60 per cent more gas than a 30-in. line and almost three times as much as a 24-in. line.

In this initial project, Transco used a "sewer-pipe" method of laying, welding the pipe in the ditch except at river crossings. The pipe was yard-coated. Bends were made in the field *(The Oil and Gas Journal, October 18, page 74)*.

Natural Gas Gaining

WASHINGTON. — The stretching arms of natural-gas pipelines are gathering in more and more of the nation's energy market.

It is natural gas, not oil, that has been largely responsible for the shrinking market for coal in recent years, the Bureau of Mines disclosed.

In terms of the heat provided (in British thermal units), natural gas accounted for a flat 25 per cent of the country's energy consumption last year. That was an increase of 2 per cent over 1953, and nearly double the 13 per cent reported for 1945.

Oil is still the biggest source of energy. It accounted for 41.8 per cent of the total last year, compared with 40.5 per cent in 1953 and with 31.9 per cent in 1945.

The figures showed that gas took over nearly two-thirds of the loss of coal from 32.6 per cent in 1953 to 29.3 per cent last year. The energy supplied by water power remained unchanged at 3.9 per cent.

In 1900, coal provided 88.9 per cent of the nation's energy. Oil accounted for 4.7 per cent and natural gas for 3.2 per cent. The remaining 3.2 per cent was from water power.

The bureau's figures showed that foreign oil accounted for nearly one-seventh of the energy from oil last year. Domestic oil took 35.9 per cent of the total national energy market against 34.9 per cent in 1953. Foreign oil took 5.9 per cent against 5.6 per cent.

Hugoton Strike

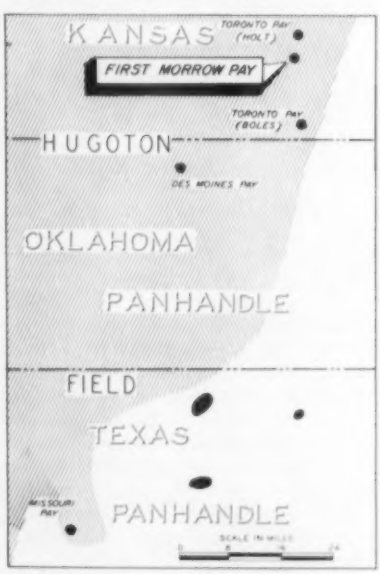
First Morrow pay hit by Panhandle in Kansas test

LIBERAL, Kans.—Panhandle Eastern Pipeline Co. has come up with the first Morrow sand production and the fifth pre-Permian pool in Hugoton field.

Panhandle found gas and distillate on a drill-stem test of the Morrow at 5,986-6,009 ft. at its 2-20 Shuck, 2½ miles north of Pleasant Valley in southwestern Seward County, Kansas. At the end of 5 minutes, the well flowed 606 M.c.f. of gas daily and in 90 minutes it gaged 1,254 M.c.f. per day. Recovery was 15 ft. of distillate-cut mud. The wildcat is drilling below 6,300 ft.

Other pre-Permian pools . . . In the past 2 years, Pennsylvanian and Mississippian production has swept around the field's limits. In 1954 deep tests inside the field proved successful in Kansas, Oklahoma, and Texas.

The Panhandle well is 5½ miles southwest of Cities Service Co.'s Toronto gas discovery at 1 Holt. It is 8½ miles northwest of Toronto gas production at Panhandle's 1-4 Boles. Other Hugoton field pre-Permian production is located at Oceanic Oil Co.'s Swinger Des Moines discovery in Texas County, Oklahoma Panhandle, and at a Missouri lime oil strike in Sherman County, Texas Panhandle.



Operators hold key to . . .

. . . Cutting Drilling Costs

Ed McGhee

NEW ORLEANS.—Operators can get their wells drilled cheaper by cooperating with the contractor. Here are some of the things they should do:

. . . **Give complete** information in a bid proposal.

. . . **Use a standard** drilling-contract form.

. . . **Standardize** blowout-preventer hookups.

. . . **Make sure** the contractor's rig is adequate.

. . . **Design a mud program** for safest drilling as well as best control.

These are the proposals of J. U. Teague of Columbia Drilling Co., Houston. In addressing the A.P.I. Division of Production Southwestern District meeting at New Orleans last week, Teague reminded the operators that time is money to the contractor. The attack on time, he said, can best be made by cooperation.

Teague cited the recent findings of the American Association of Oilwell Drilling Contractors that footage prices have remained about the same over the last 14 years, while costs to the contractor have doubled *(The Oil and Gas Journal, February 7, p. 79)*. Obviously, faster drilling made this possible. Jet bits, oil emulsion muds, the cantilever derrick, and long drill-collar strings were some of the most important means used to speed drilling.

Now, Teague said, the most promising way to cut footage prices further is teamwork between contractor and operator.

Better bid . . . For a contractor to make an intelligent bid, he must know several things. Among these are the contract depth of the well, estimated total depth, proposed casing program, hole sizes, mud program, road conditions, availability of water and fuel, records of other wells in the area, and the amount of "free time" expected. He should also know of any protective clauses in the contract, such as the "Gulf Coast clause" or the "12.5-lb. mud clause" common to Gulf Coast contracts and the "chert clause" common to West Texas and the Rockies.

If the contractor knows all these things, Teague said, his bid will be most favorable to the operator. If he doesn't know, the contractor will add enough to the bid to take care of the uncertainties, and the operator may have to pay too much for the hole.

Chances are that the operator has much of the desired information in his files. A few minutes' clerical time in getting it for the contractor will help both parties.

Standard contract . . . Today's drilling contracts vary from company to company, and even from district to district in the same company. Some of the forms, Teague said, must take a roomful of lawyers to write. However, he believes a drilling contract was never written that is not technically violated by both parties before the well is spudded. There are cases where the contractor and operator simply must accept common responsibility.

The A.A.O.D.C. offers a standard drilling-contract form which fixes responsibility of both parties. If it were standard, there would be no doubt for either contractor or operator about what is expected. That standard contract is fair and should be adopted, he said.

What's "free time"? . . . Teague claims there is no such thing as "free time" on a drilling rig. Labor, fuel supervision, and maintenance go on, regardless. Yet, some operators expect "free time" for running electric logs, taking cores, or waiting on cement. Since the contractor has only one customer, that one customer, the operator, ultimately has to pay for so-called "free time."

Take the case of the operator who demands 96 hours of "free time" after cementing the oil string. His contractor's rig costs $800 per day to operate. So, $3,200 must be added to the footage price. If the well is dry and no oil string is set, the operator pays $3,200 for "free time" he never got.

If the contract had put the rig on day work at total depth, the operator would have gotten a cheaper footage price, and saved $3,200.

That 2° costs money . . . Most contracts fix the maximum deviation of the hole from vertical. If the operator specifies a 2° maximum when 10° is good enough, he will pay more than necessary for drilling his well.

The prudent contractor, Teague said, takes the maximum deviation into consideration when he makes his bid. If he is allowed a liberal deviation, he can usually drill faster. Moreover, a well with a higher, but gradual, increase in deviation is safer to drill than one with reversals in direction caused by efforts to keep deviation at a minimum.

Some contracts allow a sliding scale of deviations, with the allowable deviation increasing with depth. This, said Teague, is the best solution. He said maximum deviation should be as generous as possible.

Oil emulsions . . . Teague reminded his listeners that the type of mud has a lot to do with the drilling rate. He said, however, that many companies use mud programs that add nothing to safety but penalize the contractor in drilling rate.

If a low water loss is needed, the contractor would prefer oil-emulsion mud. He can give a better price because he knows he will be able to drill faster with less risk of stuck pipe.

Teague suggested that the mud programs be planned to give the fastest drilling consistent with safety.

Good standards needed . . . Practically every company in an area has different requirements about the contractor's blowout-preventer hookup. As a result, the contractor must keep a lot of money tied up in several kinds of equipment to do the same job. Some companies may specify that the blowout preventer be rated for a pressure that would rupture the casing on which it sits.

Teague did not advocate any less protection. He expressed the hope that standards could be set up. With standards, the contractor could lower his investment and still give adequate protection.

The contractors should have their rigs standardized. If the rig isn't adequate for the job, it takes longer to drill a well. Too, there is more chance for hole trouble and mechanical trouble.

Operators also have costs directly related to time. Mud-treatment cost and loss of production are examples. Therefore, Teague said, the operator loses through inefficient and slow performance by the contractor. It would be a safeguard for both if the A.A.O.D.C. and the American Petroleum Institute set standards by which to classify rigs, he said.

Contractor has debt, too . . . Teague admitted that the contractor owes certain things to the operator. First, the contractor should remember that he is a representative of the operator. He should not endanger the operator's reputation by poor public relations.

Another responsibility of the contractor is to upgrade his personnel. The "driller's school" at Odessa, Tex., is a step in the right direction. Moreover, the A.A.O.D.C. is sponsoring safety clinics that give good pointers for drilling personnel to follow.

Hydrogen atom put to work in . . .

Photo-Magnetometer Survey

NEW YORK.—A physicist-inventor and an aerial mapping firm have combined forces to offer the oil industry a service which makes aerial maps and a magnetometer survey at the same time.

The new service makes use of the Varian magnetometer, which its designer says is simpler, more accurate, and easier to use than any in use today. Dr. Russel Varian, president of Varian Associates, Palo Alto, and Hycon Aerial Surveys, Pasadena, Calif., have formed a corporation to license the service to industry.

A description of Varian's instrument sounds deceptively simple. It makes use of hydrogen nuclei to record minute changes in the earth's magnetic field. The hydrogen nuclei have magnetic poles and spin in a magnetic field with a constant rate of spin for a given magnetic field strength. Any increase in the magnetic force increases the rate of spin of the nuclei in direct ratio. Thus, the instrument is absolute and needs no calibration.

Varian says any hydrogen compound can be used in this principle, but he uses water. It is cheapest and works as well as any.

Varian's magnetometer is little more than a polyethylene bottle of water surrounded by a coil and housed in a streamlined cone. Alternate current is fed to the coil, building a strong magnetic field in the water sample. This "lines up" the hydrogen atoms at right angles to the field.

Once the atoms are polarized, the current is shut off and the coil is used as a pickup. The hydrogen atoms then spin at a rate determined by the earth's magnetic field inducing voltage in the coil. This feeds back to the instrument's recorder. The signal is amplified and the rate of spin of the atoms is recorded. The signal can be transmitted by wire or radio to the recording instrument.

Varian claims his instrument is more reliable than others and simpler because no gyroscopic stabilization is needed. Any change in the direction of the magnetometer bird will change the magnitude of the signal, but not the frequency. The frequency is what is measured, not the strength of the signal.

In geophysical exploration, the instrument can be flown at varying altitudes in a grid pattern. Readings of variations in the earth's magnetic field are taken every 2 seconds. A camera, synchronized to the instrument, takes photos of the terrain as it is surveyed. The photographs are oriented by an overlay showing identification points and a second overlay shows reading points connected by lines of equal magnetic force.

Lower altitude flights with a plane or helicopter for more detailed readings of interesting areas can follow the first survey. The instrument can also be used on the ground to pinpoint areas, its designer says.

The joint company will license the device to not more than two firms in any one area. The equipment is for lease only—not for sale. No contracts for its use have yet been made.

Industry Briefs

TEXAS CITY, Tex. — Monsanto Chemical Co.'s Plastics Division has started producing polyethylene at its plant here. The commercial production is based on a high-pressure process. Monsanto is making a research study of a low-pressure polymerization process.

BILLINGS, Mont.—Carter Oil Co. will dedicate the world's first commercial fluid-coking unit at its refinery east of here March 18. The 3,000-bbl. per day unit converts heavy residues from vacuum and other operations to middle and light distillates. Hines H. Baker, president of Humble Oil & Refining Co., Houston, will be principal speaker at the dedication.

SHANDAKEN, N. Y.—Dome Oil & Gas Corp. has tested a wildcat in the Catskill Mountains and found a noncommercial show of gas. The well, located near here and 125 miles northwest of New York City, flowed between 35,000 and 50,000 cu. ft. daily from 5,360 ft. in the Schoharie shale. The company said it would drill more wells this spring. Dome Oil and Transcontinental Gas Pipe Line Corp. recently entered an agreement for joint exploration in the area *(The Oil and Gas Journal, December 27, page 108).*

SACRAMENTO. — The California Lands Commission on March 9 voted to advertise for bids on a 320-acre tract off Huntington Beach. Drilling may be done by slant drilling from upland sites or from offshore islands. If drilling is done from an island, the island must be at least 1 mile from shore. Leases will protect residential and recreational facilities.

DENVER.—Gibraltar Oil Co. has sold three producing oil wells and seven-eighths interest in 400 acres in the Kimball field of Kimball County, Nebraska, to the T&T Oil Co., Santa Fe Springs, Calif. The price was reported as $400,000. The Don M. Rounds Drilling Co., Denver, will continue to hold the one-eighth interest in the wells and property. Gibraltar said the three wells are producing 300 bbl. of oil daily.

DENVER.—Butte Pipe Line Co. has been formed by Shell Pipe Line Corp. and Murphy Corp. to operate the 450-mile crude line to be built between northeastern Montana and southern Wyoming. The line, most of which will be 16 in. in diameter, is scheduled to be completed by September.

Split in A.P.I. District Urged

NEW ORLEANS.—The A.P.I. Division of Production is considering a split of its vast southwestern district. The district now includes Mississippi, Louisiana, Arkansas, and New Mexico and all of Texas except the Panhandle.

The proposed split would separate North and West Texas and New Mexico from the other areas.

The southwestern district is outgrowing itself. A.P.I. officials cite the fact that 58 per cent of the country's oil production is concentrated in the district. There are four other A.P.I. districts—Mid-Continent, Pacific Coast, Rocky Mountains, and Eastern. No one of these has more than 16 per cent of the nation's production.

There are 28 active local chapters in A.P.I. Fourteen of them are in the southwestern district. The split, as proposed, would put nine of these in the eastern area and five in the western.

The five districts of A.P.I.'s Division of Production were set up in 1928, and no changes have been made since. However, the oil picture has changed drastically.

Annual meetings of the A.P.I.'s southwestern district have become larger and larger. About 420 persons attended the 1950 meeting; in 1954 there were more than 1,500. Unofficial estimates of this year's meeting, held in New Orleans last week, indicate it was as big as last year's.

However, A.P.I. officials have noted that about 80 per cent of those attending past meetings have come from within 300 miles of the meeting city.

The program committees for the annual meetings have always had more than enough good papers to present. As a result, some could not be scheduled. Splitting the district should make sure that all contributed papers can be presented.

One of the biggest arguments for the split is that drilling and producing problems are drastically different from one area to the other. For instance, Gulf Coast operators are interested in offshore practices, heavily-weighted muds, and extra-high pressures. These things are of no concern to many of the West Texas and New Mexico operators. They are more interested in crooked-hole problems, air drilling, and hard-rock drilling.

The dividing line proposed by A.P.I. officials starts at Red River and extends straight south about 20 miles east of Dallas to a point northeast of Waco. From that point, the line slants southwest, just above Austin and San Antonio to the Rio Grande.

The proposal was referred to the meeting for opinions. Although no official poll was taken, most seemed to be in favor of the split. The general committee of the Division of Production must make the final decision. It is expected before the end of the summer.

Gas Hit in Oregon

Exploration intensified along proposed pipeline

ONTARIO, Ore.—A blowout at an eastern Oregon wildcat spurred interest last week in exploration along the route of the proposed Pacific Northwest pipeline.

The key wildcat is Oroco Oil & Gas Co. and J. R. Simplot Co. 1 Bolles, second recent test in this part of the state. It is in Malheur County near the Oregon-Idaho border. The well unloaded 600 ft. of highly gas-cut mud before being brought under control. At last report, operators were running logs after drilling to 1,540 ft.

The well is about 25 miles northeast of a 7,500-ft. failure recently drilled by El Paso Natural Gas Co. It is 2 miles north of Oroco's 1 Carpenter, which is across the state line in Payette County, Idaho. The Idaho test was temporarily shut in after finding gas shows at 1,442 and 1,750 ft. It was drilled to 2,775 ft.

Sinclair Oil & Gas Co. is reported to have finished arrangements for a farmout deal with Ray Ranger, Houston, under which he would drill a wildcat on Sinclair's 45,000-acre block in Malheur County's Willowcreek area. Sinclair has completed surface work in the area, which is covered with Tertiary sediments.

So far, Oregon has no commercial oil or gas production.

El Paso's recent dry hole is in Malheur County, in Sinclair's Devil Mountain block. Some gas shows were reported at this test, but details were not released.

These tests are all in the Vale-Ontario basin, which straddles the Oregon-Idaho boundary. They are within a few miles of the route selected by Pacific Northwest Pipeline Corp. for its New Mexico-Washington gas line.

Mandan to Get Ultraformer

MANDAN, N. D.—Standard Oil Co. (Indiana) will build a 6,000-bbl. Ultraformer this summer at its recently completed refinery here.

Ultraforming, a new catalytic reforming process developed in the company's laboratories, was not available when the Mandan refinery was being built.

The company will also increase its steam generating capacity and other utilities to service the Ultraformer.

The Ultraformer is the fourth to be announced for Standard Indiana's refineries. In addition two are operating and a third is planned in refineries of subsidiaries. Five other Ultraformers have been licensed for installation by other companies.

Crude Line Abandoned

AYR, Neb.—Service Pipe Line Co. has begun dismantling 11 Nebraska substations no longer needed because of abandonment of its crude pipeline from Fort Laramie, Wyo., to Freeman, Mo.

The substations, which had employed about 100 men, are located at Ayr, Deshler, Kearney, and North Platte. The Ayr station is the first to be dismantled.

Union Fights Pipeline Plan

LOS ANGELES.—Southern Pacific Co.'s proposed 800-mile products pipeline may run into some legal red tape.

The local Teamsters Union (A.F. of L.) has asked its international headquarters in Washington to help block construction of the common carrier. Union officials were urged to intercede with the Interstate Commerce Commission and any other federal agencies concerned.

The railroad company proposes to build lines from Los Angeles and El Paso refinery areas to Phoenix and Tucson. *(The Oil and Gas Journal, February 28, page 77).* The pipelines would generally follow the railroad.

One argument advanced by the union is that a pipeline adjacent to a railroad would jeopardize national defense since both could be knocked out simultaneously.

Crude Loop Planned

Magnolia to add 215 miles to Midland-Corsicana line

DALLAS.—Magnolia Pipe Line Co. will begin early in April laying 215 miles of 12, 14, and 16-in. pipeline along its crude system from Midland to Corsicana, Tex.

Magnolia now operates a 335-mile, 12-in. line, looped in places, between the two towns. The new work will fill in the gaps between loops and give the company two complete lines.

Capacity of the system out of the Permian basin will be hiked from 128,000 to 162,000 bbl. daily.

The expansion program also calls for doubling of pump horsepower of the six pump stations along the system to total 21,600 hp. The company now has two centrifugal pumps driven by 900-hp. motors at each of its stations at Midland, Itan, Sweetwater, Clyde, De Leon, and Walnut Springs. The complete new line resulting from the construction will have the same equipment and will be operated separately.

Work on other line . . . Magnolia also will build a new pump station at Groveton, Tex., on its recently completed trunk line from Corsicana to Beaumont to handle increased throughput from West Texas. Completion of the Groveton station will hike capacity of this line from the present 130,000 bbl. to 165,000 bbl. daily. The station will have two centrifugal pumps driven by 1,500-hp. motors.

Contract for the project is expected to be let this week. All work is slated for completion by October 1.

Crude oil pumped through Magnolia's Permian basin system goes either to Magnolia Petroleum Co.'s refinery at Beaumont or to eastern plants via Magnolia's 20-in. line from Corsicana to Patoka, Ill. From Patoka, the company operates a 10-in. line to Lima, Ohio, and a 10 and 12-in. line to East St. Louis, Ill. Magnolia has connections at Patoka with Texas-Empire Pipe Line Co. and Ohio Oil Co.

Gasoline Plant Started

ARTESIA, N. M.—Valley Gas Corp. has started building a new natural-gasoline plant in Anderson Ranch field, Lea County, New Mexico.

The plant will process up to 5,000,000 cu. ft. of gas daily from the Wolfcamp and Devonian producing formations in the field and will produce at capacity 50,000 gal. daily of a propane and heavier mix. The product will be moved by pipeline to Valley's Loco Hills plant in Eddy County where it will be fractionated.

F. S. West, president of Valley, said the plant would be ready for operation by June 1. Engineering and construction is being handled by F. S. West Co., of Houston and Whittier, Calif.

Plant facilities will include a semi-automatic mechanical refrigeration unit designed to recover 75 per cent of propane, a gas-sweetening unit, and a de-ethanizing column.

General American Trades

DALLAS. — General American Oil Co. of Texas, one of the industry's most active production and lease traders, has made two more deals.

The company bought interests in 85 wells in Foster and Harper fields of Ector County and Wasson field of Yoakum County, West Texas, from Big Chief Drilling Co., of Oklahoma City.

It sold lease permits on 419,404 acres in British Columbia to Triad Oil Co., Ltd.

The West Texas purchase totaled 11½ net wells with a reserve of about 1,500,000 bbl., General American said. The Dallas firm paid for the wells with 9,000 shares of its stock and a commitment to pay $1,000,000 out of 90 per cent of oil and gas production from the wells.

The Canadian sale was made by General American Oils, Ltd., subsidiary of the Dallas company. General American received $607,235 in cash and an overriding royalty of 30 per cent of net profit from any production which might be established.

Triad is required to pay all rentals and fees and perform all work necessary to keep the permits in force for a year.

County May Have Production

PADUCAH, Tex. — West Central Texas' Cottle County has prospects of its first commercial production.

Sequoia Drilling Co. recovered 3 bbl. of fluid an hour in swabbing its 1 Wilie, which is 10 miles west of here and 25 miles northwest of nearest production in King County. The fluid was reported to be 60 per cent oil and 40 per cent salt water. The pay section is believed to be reef, topped at 3,230 ft. on elevation of 2,046 ft. Swabbing was on perforations in casing at 3,234-39 ft. Total depth was 3,515 ft.

General Crude Oil Co., Abilene, plans an offset about ¼ mile southwest of the discovery prospect. The offset will be designated 39-1 Swenson Development Co. "B."

Pollution Milestone

Agency says oil operators aren't contaminating water

AUSTIN.—The Texas Railroad Commission says oil operators in World field of Crockett County aren't polluting fresh-water sands in the area.

The Texas conservation agency held a series of hearings on complaints of municipal authorities and land owners that operators were improperly disposing of salt water produced with oil. *(The Oil and Gas Journal, December 13, 1954, page 97.)*

The complaints, supported by the Texas Board of Water Engineers, said numerous fresh-water wells within 10 to 15 miles of the field became salty within the past year. This, they said, was due to irregular disposal measures, including use of inadequate evaporation pits, dynamiting of these pits in some instances, and syphoning of salt water from pits onto surface soil. They asked that the operators be required to return salt water to an underground salt-water formation.

Operators countered that the contaminating salt water could not be coming from World but must be coming from an underground strata—probably the San Andres brine.

The Railroad Commission doesn't think it has jurisdiction over pollution of fresh-water sources but held the hearings anyhow as a means of getting data on record for interested parties.

The agency recommended that further study of the case be made to find the real offender. It said that evidence presented at the hearings proved that the World field salt-water-disposal pits were not causing the contamination except in the saturated area immediately surrounding the pits.

Power forthcoming? . . . Largely as a result of the hearings, a bill is expected to be passed this session which would give the Railroad Commission the authority to set up and enforce antipollution precautions in oil operations.

The bill would require an operator to file a $5,000 bond with the commission for each well he intends to drill, or a $10,000 bond for all wells to be drilled. The bond also would be required of an operator who acquired a well not previously plugged. This bond

would be retained until the well was properly plugged.

The commission would exercise pollution control over drilling of all wells including stratigraphic tests in the production of the wells, and in plugging and abandoning them.

Wise County Block Sold

DALLAS.—Byrd Oil Corp., Dallas, has sold 75 per cent interest in a 5,800-acre lease block in Wise County, North Texas, to Christie, Mitchell & Michell, of Houston.

Byrd had completed two wet-gas producers in the Bend conglomerate before the sale. The production is about 2 miles south of Cottondale.

The Houston firm, which has assembled large gas holdings in Wise County, will pay Byrd $100,000 cash, and $150,000 out of one-fourth of the production for the block. Byrd will retain a sixteenth overriding royalty on production from present wells and a third which the Houston company is committed to drill. The override will end when $150,000 production payment is liquidated.

Christie, Mitchell & Mitchell also is bound to drill a fourth well in which Byrd will bear a fourth of the cost.

GULF COAST

Corrosion engineers told:

Protection in Gulf Now Routine

CHICAGO.—The corrosion problems faced in offshore operations can be licked.

Protecting drilling and production equipment is now just another job for the corrosion engineer, according to Charles J. Fritts, of Socony Paint Products Co., Beaumont. Fritts spoke before a session of the annual meeting of the National Association of Corrosion Engineers.

The corrosion-prevention program must be carried out carefully. But the equipment can be made to last as long as it is needed, Fritts said, if these steps are followed:

. . . **Coat the atmospheric zone** of platform steel with vinyl coatings at least 6 mils thick. This zone extends 10 ft. or more above the water line. A six-coat vinyl system gives excellent results. These include wash primer, a zinc chromate primer, three build coats, and one top coat.

. . . **Get an experienced applicator** to do all coating. He should be familiar with the material to be used.

. . . **Use platform bracing** above or below the splash zone, since this is the most corrosive area on a platform. This simplifies the protection problem.

Some recommended systems for protecting the splash zone and their cost per square foot are: (1) gunite coating, $1.50; (2) monel jacketing, $4 to $7; (3) porcelain enamel coating, $3 to $5; (4) sheet neoprene jacketing, $3; (5) flame-sprayed polyethylene, $2; (6) plastic tapes over vinyl system, $0.90; (7) metalizing, $0.95; (8) vinyl mastic system, $0.80; and (9) fiberglass-reinforced polyester plastic jacket, $3.

. . . **Cathodically protect** all submerged surfaces. Magnolia Petroleum Co. uses one magnesium anode for each 1,200 sq. ft. of steel submerged in the sea and one anode for each 2,400 sq. ft. of steel submerged in mud. Over-all cost runs 5 to 8 cents per square foot per year.

. . . **Cathodically protect** boats and barges. Slab-type anodes which give excellent protection can be bolted to the hulls.

Oil-modified alkyd coatings are used extensively on floating equipment. They do not require meticulous surface preparation, and they can be applied by comparatively unskilled men.

When welding is done on a barge, a heavy ground wire should be run from the barge to the platform. Otherwise, serious pitting can result due to the heavy current used.

Florida Test Set

Gulf ready to drill first offshore wildcat for state

MIAMI.—Drilling of Florida's first "offshore" test is scheduled to begin within a week.

Location, made by Gulf Oil Corp., is in the Florida Bay area between the mainland and the Florida Keys. It is 7 miles south of East Cape, at the south tip of the mainland peninsula, in Monroe County.

Brewster-Bartle Drilling Co., Houston, is moving in a barge-mounted drilling assembly from coastal Louisiana.

The test is projected to the Sunniland lime formation of Lower Cretaceous-Glen Rose age, expected at about 12,500 ft.

Sunniland lime, chief objective of most South Florida deep wildcats is the pay zone in the state's only two oil fields—Sunniland, 90 miles north in Collier County, and Forty-Mile Bend, 50 miles to the northeast.

Background . . . Sunniland field was discovered by Humble Oil & Refining Co. in 1943. It has 11 wells, all but 1 on the pump, and a daily average production of approximately 1,400 bbl. Altogether, Humble has drilled 21 wells in the immediate area. Fourteen were productive. Pay zone in this field is around 11,500 ft. No drilling has been done in the past 2 years.

Sunniland remained the state's only field until January 1954, when the discovery well of Forty-Mile Bend field was completed on the pump with pay at 11,322-39 ft. One other producer, also on the pump, has been completed. It is 3 miles east of the initial well. Both were drilled by a group composed of Commonwealth Oil Co., Coastal Petroleum Co., and Gulf Oil Corp. Production of both has been small, and with water. Two dry holes have been drilled.

Other activity . . . In addition to the new Gulf test, there are only two other active wildcats in the South Florida basin. Humble is drilling a deep test about 8 miles northwest of Sunniland field. Continental Oil Co. is building roads to a location for a rank wildcat in Highlands County, more than 60 miles north of Sunniland.

Wildcatting in southern Florida generally has been limited to relatively few scattered deep tests. Four of these have been drilled on the Florida Keys, including one by Peninsular Oil & Refining Co. in 1939; another (off Key Largo in Barnes Sound) by Republic Oil Co., in 1946; the third, on Big Pine Key, by Gulf Oil Corp. in 1947; and the fourth, on Key Largo, by Sinclair Oil & Gas Co. in 1953. Depths ranged from 10,066 ft. in the Peninsular test to 15,455 ft. in the Gulf test.

White House on Fence

Eisenhower shuns outright support of cabinet gas report; ideas are those of advisors, not President, aide says

WASHINGTON. — President Eisenhower wants to stay friends with everybody in the fight over federal control of natural-gas producers.

The Cabinet fuels committee recommendations for exemption of the producers brought a storm of protest from consumer spokesmen. The White House quickly backed away from anything like outright support of the report. It was the recommendation of an advisory group, not of the President, was the White House position.

There are some 30,000,000 gas consumers, not more than 5,000 producers. Whether the President will come out, sooner or later, for or against amendment of the Natural Gas Act was left up in the air.

White House position . . . Eisenhower's position was revealed by Gerald D. Morgan, special counsel to the President, in a letter to Rep. Glenn R. Davis of Wisconsin. Davis had asked the White House to withhold any support of the committee's recommendations until a meeting could be had to get the views of the National Institute of Municipal Law Officers, which is opposed to exemption of independent producers from federal price regulation.

The Cabinet committee made recommendations which would define the parts played by the federal Government and the states in regulation of the natural gas industry. They would limit the Federal Power Commission to the control of interstate transportation *(The Oil and Gas Journal, March 7, page 84).*

"These recommendations do not, however, represent recommendations of the President," Morgan said.

"They are merely recommendations of the advisory group to the President."

Davis was assured the views of consumers would be considered by the White House.

"The President expects to give thorough consideration to these recommendations with a view to achieving maximum protection of the interests of the consumers," Morgan said.

Congressional lineup . . . Members of Congress meanwhile, are lining up behind the policies laid down in the Harris bill, which writes out the recommendations made to the President.

A duplicate of the Harris bill was offered in the House by Rep. Carl Hinshaw of California, making the effort to exempt producers from regulation bi-partisan. Harris is ranking Democratic member of the House interstate commerce committee; Hinshaw is second-ranking Republican member.

Hinshaw called his measure "a bill to protect consumers of natural gas from unreasonable rates and to exempt independent producers from federal price control."

The purpose of his bill, he said, is to make natural gas from a few states freely available to other states. That will not be possible as long as there is any threat of federal price control, he said.

Since the Supreme Court decision in the Phillips case last June, Hinshaw said, there has been a tendency to keep the gas within the state where it is produced. This has not yet affected the general public, but it could quickly do so under federal regulation.

Gas committee acts . . . With the introduction of the Harris-Hinshaw bills, the general gas committee in Washington swung into action.

In a fact sheet explaining what the producers want, the committee answered consumer spokesmen who say regulation of producer prices would bring tremendous savings to gas users.

Even if the producer gave the gas to the transmission company free of cost, and if this saving in cost was passed on to the consumer, it would make little difference in the average householder's gas bill, the committee declared.

The regulated interests—the pipelines and distributing companies — account for about 90 per cent of the price paid by the home consumer. "It is obviously misleading to say that control of the producer's price by the FPC will result in substantially lower costs to the consumer."

Free competition among producers made it possible for the natural gas industry to grow, and kept prices from skyrocketing, the committee said. Since 1945 the cost of living has gone up 49.7 per cent, but the price of all types of gas rose only 12 per cent.

"Competition has always been the most effective insurance of a reasonable price," the committee went on. "This has been amply demonstrated in the case of the natural-gas producer—unregulated. Intense competition among gas, coal and oil for the energy market—and intense competition for markets within the gas industry itself—has made gas, at the wellhead, more than twice as cheap as coal at the mine and several times as cheap as fuel oils at the refinery."

Plant Sales Opposed

Texas senators make effort to include Baytown plant

WASHINGTON.—Sale of the Government's synthetic-rubber plants ran into opposition on both sides of the Capitol last week.

But there was considerable support for giving the disposal commission more time to sell the GR-S plant at Baytown, Tex., if it could be done without upsetting the whole program. The big 44,000-ton plant is the only operating rubber plant not listed in the disposal program now before Congress.

The Senate banking committee and the House armed services committee ran hearings, one after the other. Both took up the sales program and the Baytown disposal at the same time.

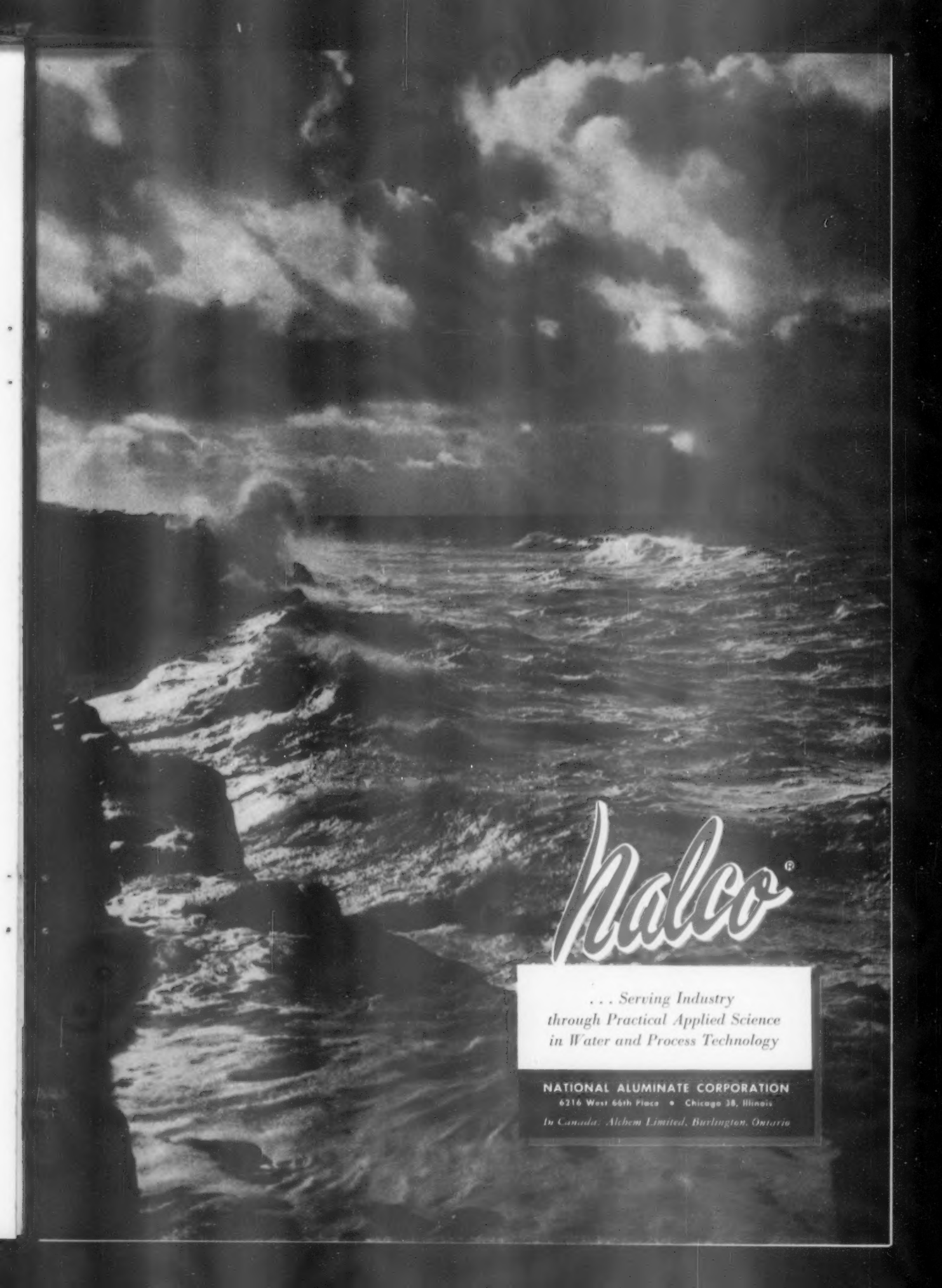
The opposition to turning the rubber industry over to private enterprise will be shown when the committees report later this month. Congress has until March 25 to disapprove the program worked out by the commission.

Industry witnesses, Congress members, and others opposed to the sale were being heard at the end of the week. Earlier, Lyndon Johnson and Price Daniel, Texas senators, explained their bill to keep the Baytown plant from being moth-balled.

Sen. Homer Capehart of Indiana said it might upset the sales program. But Johnson said the commission would follow the same rules that applied in selling the other plants. If the commission does not get a satisfactory offer, he said, it will not have to sell.

Phillips opposed . . . Johnson disclosed that a local group, wanting to keep the plant going, is ready to buy it at an "acceptable" price if the commission does not get other good offers. The only bid on the plant last year was offered by the operator, General Tire & Rubber Co. It was below what the commission felt was a fair value and no deal was made.

The commission polled the buyers of the other plants on how they felt on allowing more time to sell Baytown.


Nalco®
. . . Serving Industry
through Practical Applied Science
in Water and Process Technology
NATIONAL ALUMINATE CORPORATION
6216 West 66th Place • Chicago 38, Illinois
In Canada: Alchem Limited, Burlington, Ontario

Only three had objections to the bill. Firestone Tire & Rubber Co., one of the three, said it would not object if the bill didn't affect sales already made. The Copolymer Corp. said it was "neutral" but not opposed. Only Phillips Chemical Co. offered any opposition.

R. W. Thomas, vice president of Phillips, told the commission that everyone had had an equal chance to bid on the plants. Anyone who did not, he said, "must believe that he will gain some special competitive advantage by not attempting to bid after closing of bids." The bill, he said, is "unwise, unfair, and improper."

Senate Near Import Showdown

Groups on both sides of quota question think balance could swing either way; neither likes voluntary idea

WASHINGTON.—Protectionists and free-traders are warily eyeing each other as the Senate heads toward a showdown on oil import quotas.

Both sides are fighting scared as signs mount that the vote could be very close. They agree it could go either for or against a quota by a hairline margin.

But they are agreed on one point, though for different reasons. They are against voluntary quotas, to be set up by the importing companies themselves.

Importers were given a suggestion last week to ignore the call of the Cabinet fuels committee for voluntary restrictions. Charles E. Taft, president of the committee for a national trade policy, said quotas, even on a voluntary basis, are "the most severe and absolute kind of trade restriction."

Taft denounced quotas in a long attack on the Cabinet committee which he sent to the White House. He told President Eisenhower he shouldn't reach any decision on the point until he had directed the committee to hold public hearings.

Many Congress members also are against voluntary quotas. They don't believe it will work. Rep. John P. Saylor of Pennsylvania told the House it would be "naive" to expect the companies to follow a "sane course."

Saylor feels it would be "risky business" to encourage the companies to get together on an import program. "The next move in such collusion is the further regulation of their prices," he said.

The independent refiners saw possibilities of company control of imports in the decision by Standard Oil Co. (Calif.) to reduce them this year. But M. H. Robineau, president of the Independent Refiners Association of America, warned that this action will help "only if it is in fact carried out by all large importing companies and in the spirit of preserving the national interest in a healthy domestic industry."

If the move fails, Robineau said, the association will continue its fight for a voluntary agreement forcibly imposed on the companies under an import policy Congress will be asked to write.

In his analysis of the fuels report, Taft was especially critical of the Neely amendment to the Reciprocal Trade bill providing for a 10 per cent quota on oil imports. It would cut total imports by 26 per cent, he said. It would cut residual imports by 60 per cent, without much help to the coal industry for whose benefit it is written. It would wreck Venezuela's dollar position, he charged.

Taft said the Cabinet report was "puzzling" and "confusing." It lumped together crude and residual. Foreign residual competes with coal, he pointed out, but foreign crude competes only with domestic crude and has little effect on coal.

Taft said the figures on drilling and production show that domestic producers have little fear of foreign oil at this time. What they do fear, he said, is the possibility of future increases in cheap oil from the Middle East.

Meanwhile, the Senate finance committee, sitting day and night, is trying to wind up its hearings on extension of the trade agreements law. Testifying before it are representatives of many industries demanding increased protection against the competition of foreign goods. The domestic oil producers are only one of a number of groups, but they have the widest backing in Congress. The importing companies and some distributor groups are opposing the producers.

Richfield Goes to Court

WASHINGTON.—The right of labor to dictate the terms of an employer's plan to help workers buy stock in the company is being tested in the courts.

Richfield Oil Corp. is challenging a National Labor Relations Board ruling that it must bargain with the Oil Workers International Union over its stock purchase plan. It has asked the District of Columbia federal court whether it has to comply with the order.

The company says the NLRB order destroys its ownership rights. It adopted the plan voluntarily, and claims it is not a form of wage or term of employment within the meaning of the National Labor Relations Act.

If stock purchase plans are made a point of compulsory bargaining, Richfield argued, the union can force employes to invest their funds against their will. If a corporation is compelled to bargain on this point, partnerships and individual employers also will have to bow to union demands. Those demands could be enforced by strikes or other actions supported by the federal law.

Congress never intended the act to compel collective bargaining on such plans, the company contends.

Tax Choices Offered

WASHINGTON.—Delay rentals on nonproducing oil and gas leases may be capitalized as investment or listed as carrying charges in the income reports of lessees, the Internal Revenue Service said last week.

This option was made possible by a ruling that undeveloped oil and gas leases will be classed as unimproved and unproductive real property. The Internal Revenue Code gives the taxpayer the choice of writing off the carrying costs on such property as expense or capitalizing it.

The service said a taxpayer need not treat all his properties the same way. He may capitalize the carrying charges on one or more projects even though he does not choose to do so on others. An oil and gas lease is held to be a separate property and can be handled as a separate project.

Import Plan Wins Round

WASHINGTON.—The Federal Power Commission refused to throw out the plan of Northern Natural Gas Co. to import natural gas from Canada.

The commission made it clear, however, that this does not mean the company's application will be granted. It refused only to short-cut its investigation and decide the case before all the evidence was in. Northern Natural finished its evidence in January, but its witnesses have not yet been cross-examined. Hearings will be resumed as soon as possible, the FPC said.

The company plans to build pipelines at a cost of $32,813,000 to increase the capacity of its system by 133,000 M.f.c. per day. The additional gas supply would include 33,000 M.c.f. from sources in this country and 100,000

M.c.f. to be purchased from Trans-Canada Pipe Lines, Ltd.

Dismissal of the application was asked by eight of the company's utility customers. They were joined by coal, labor and railroad interests which charged Northern Natural had not made a case.

Commisisoner Nelson Lee Smith, joining with the FPC majority, said he was "strongly impelled" to vote for dismissal because of "glaring deficiencies" in the company's evidence. But dismissal, he said, "might sound the death knell of the Trans-Canada project, to the possible economic detriment of both Canada and the United States."

Safety Bill Up Again

WASHINGTON. — The Labor Department wants to make industry safer for the worker.

Secretary James P. Mitchell has sent a bill to Congress which would give the Government supervision over state industrial safety programs. He asked for $2,000,000 to get the plan rolling.

This is not a new idea. It has been offered to Congress three times in the past. Congress has never taken to it.

The bill provides for a system of grants-in-aid to the states for the enforcement of federally approved safety programs.

Technical Aid Takes Time

WASHINGTON.—The Government will have to stretch its technical aid program for underdeveloped countries over many years to get real results.

Arabian American Oil Co. has been carrying on this kind of work for 15 years in Saudi Arabia and still has a long way to go, James T. Duce, vice president of the company, told the Senate foreign relations committee.

The committee is studying the work of the Foreign Operations Administration. The FOA is the successor of the Economic Cooperation Administration which handled the Marshall Plan adopted in 1948.

Duce warned that a short-term program won't work. It is largely a matter of education, which requires years. In the Near East, particularly, it is important that the aims of the United States are fully understood.

Near East governments, Duce said, have frequently believed FOA is a tool to advance American political policy rather than an aid program. In one country FOA has been forced out for political reasons; in another the government would not join in a program, and in a third the government withheld its support and leadership.

WATCHING WASHINGTON

Bertram F. Linz

Manpower Protection

Changes in manpower policies to protect oil and other essential industries against the loss of key men in case of another war are being studied in Congress.

There is already a shortage of scientific and technical workers. It's getting worse. In wartime it would be a major problem. It would require a delicate balance between the needs of the armed forces and the needs of industry. In the last war, the military at first paid little attention to the warnings of industry against drafting too many skilled workers. Later, it had to change its mind.

Industry says these men should be called into service only to meet specific needs for scientific or technical knowledge. Unless they are absolutely needed in their professional capacities, they should be left in the industries of which they are a vital part.

It's bad enough when the draft takes the young skilled workers. It would be worse if the reservists were called. They are mostly older men who have had a longer period to acquire the key skills that are needed most.

A bill to set up a big reserve and shorten the draft service of men who join it is being written. Industry is asking that it provide for screening reservists called to active duty. Eessential industries stripped of their key workers would have difficulty in meeting military and civilian requirements in the event of war.

Stripper Costs Scored

Treasury Secretary George M. Humphrey is not making friends among the stripper-well operators.

He told the Senate finance committee the Government shouldn't encourage "uneconomic, high-cost production" of oil, coal, or minerals, even if they are defense items.

Defense officials thought the same thing in early World War II days. By 1944 they had changed their minds. The Office of Price Administration paid subsidies up to 35 cents a barrel to keep the stripper wells going. In the 15 months until the war program was closed out, the Government paid just short of $65,000,000. That brought 176,765,000 bbl. of oil out of the ground at a time when the military needed every gallon it could get.

Humphrey tangled with Oklahoma Sen. Robert S. Kerr over the effect of foreign competition on the mining industry. He threw in oil for good measure. The Korean war brought a lot of production that will never be economic, he said. Our mobilization base shouldn't stimulate high-cost production.

Leases Paying Off

The Interior Department already has collected $1,435,000 in rentals from leases on the Continental Shelf.

With the bonuses received from the sale of leases last year, the Government already has taken in $142,404,630. The department made the figures known when it mailed the 114th and last of those leases to the Atlantic Refining Co. and Tide Water Associated Oil Co. this month.

Department engineers have mapped 12,000,000 acres off Louisiana and 8,000,000 acres off Texas as possible oil, gas and sulfur lands. It has already leased 419,721 acres off Louisiana and 67,149 acres off Texas. It will sell more leases before midyear if the industry wants them —and the industry probably will.

The Government will get anywhere up to $5,000,000,000 if it can lease all of the 20,000,000 acres it has mapped.

Imports Get Blame

Sen. Matthew M. Neely of West Virginia believes workers in his and other states are losing their jobs because of imports.

With 16 other senators, Neely has introduced a bill to slap a 10 per cent quota on oil imports. Last week, with Sens. George Bender of Ohio and Herbert Lehman of New York, he opened hearings to prove his point.

The oil industry isn't the only one feeling the pinch of foreign competition. Neely named a number of others, including railroads, textiles, lead, zinc and, of course, coal.

Neely has some facts to back up his charges. West Virginia paid $30,000,000 unemployment compensation to out-of-job workers last year. Other states also have noted an increase in jobless claims.

ROCKY MOUNTAIN

New Tax Proposed

Levy on oil production considered in Colorado

DENVER.—A 3 per cent tax on the production of all irreplaceable natural resources, including oil, is being considered by the Colorado senate.

The new proposal would require amending the constitution by a vote of the people. It is in addition to a measure offered in the house last month calling for a flat 5 per cent severance tax on oil and gas removed from the ground.

The proposed amendment must clear both the senate and the house by two-thirds majority before gaining a spot on the November 1956 general election ballot. If it is approved, the legislature then would levy a tax not to exceed 3 per cent on each item of production.

Several oil companies in Colorado are now paying an oil severance tax, actually a gross income tax, under protest. They claim the levy is illegal. The California Co. has threatened to file a lawsuit to determine its constitutionality.

The proposed amendment was introduced by Republican Frank L. Gill, president pro tempore of the senate. He said that if the amendment is approved by the legislature, an agreement might be reached with the oil companies "to call off that suit."

He said he was unable to estimate how much revenue the 3 per cent levy might produce. The present tax is yielding about $2,500,000 annually.

Wyoming Plant Operating

NEWCASTLE, Wyo.—Black Thunder Oil's, Inc., new $400,000 natural gasoline plant 40 miles southwest of here last week began processing gas from the Clareton oil field in Weston County.

The plant has a daily capacity of 5,000,000 cu. ft. of gas and produces 10,000 gal. of liquid products.

Rapid Gas, Inc., Rapid City, S. D., has contracted for nearly all of the plant's output, according to Russell Twiford, Black Thunder president.

He said the firm plans to erect another plant of similar capacity as soon as a location is selected, probably within the next 90 days.

Black Thunder is negotiating with Ranger Pipeline Co., Billings, Mont., to utilize residue gas from both plants, Twiford said. He estimated 4,000,000 cu. ft. daily could be used to supply Newcastle.

Record Colorado Bids Made

DENVER. — The most successful bidding for oil and gas leases in Colorado's history was reported last week by the State Land Board.

The agency said that under a new competitive bonus bid system that went into effect January 1, total bonus bids received for leases on 10,934 acres scattered throughout the state amounted to $50,278. Average bid price per acre was $4.60. Some lands on which there was no competition for leasing went at the usual price of 50 cents an acre.

North Dakota Intervenes

WASHINGTON.—A brief contending Montana's controversial 1953 indefinite-term oil and gas lease law is constitutional has been filed with the United States Supreme Court by Atty. Gen. Leslie R. Burgum of North Dakota.

The law, tossed out by the Montana Supreme Court last December, has been appealed to the U. S. court by Ford Johnson, Helena, Mont., taxpayer. The ruling returned leasing to a 20-year basis.

Atty. Gen. Phil W. Saunders of South Dakota intervened in the case late in February, contending the Montana court decision was "erroneous."

Shut Down Ordered

Wyoming rule may prompt construction of big plant

CHEYENNE, Wyo. — The Wyoming Oil and Gas Commission has issued a temporary order shutting down all oil wells in the Greater Clareton fields of Weston County producing more than 5,000 cu. ft. of natural gas per barrel of oil.

The order followed a hearing March 2 at which no opposition was raised to a petition of the Greater Clareton Producers Committee *(The Oil and Gas Journal, March 7, page 90)*. The group was formed recently by operators to promote conservation practices by halting excessive flaring.

The commission hired Core Laboratories, Inc., Dallas, to find out which wells have more than 5,000:1 gas-oil ratio.

The committee, headed by James P. Sloss, Denver independent, hopes that the closing order will prompt construction of a 50,000,000-cu. ft. per day gasoline plant to serve the Clareton fields and also the Mush Creek and Skull Creek producing areas in Weston County. The committee is negotiating for the plant.

Nondrilling Penalties Cut

HELENA, Mont.—Gov. J. Hugo Aronson has signed a bill passed by the Montana Legislature lowering nondrilling penalties for the third and fourth years of state oil and gas leases to $1 an acre from the present $2.

The penalty will be increased to $1.25 for the fifth and sixth years, and thereafter will be at the discretion of the State Land Board. The penalty for the first 2 years remains at $2.

The bill also raises the annual per-acre rental fee from oil-gas lands to $1 from the present minimum of 75 cents.

Gas Line Plan Changed

COLORADO SPRINGS, Colo.—Colorado Interstate Gas Co. has asked the Federal Power Commission for authority to change the route of its proposed 22-in. natural-gas pipeline between Rock Springs, Wyo., and Denver.

The company wants to swing the line eastward to the outskirts of Cheyenne, Wyo., then run it southward to Denver via Greeley and Brighton, Colo.

Original plan was for a line running southwest of Laramie to the firm's meter station north of Denver, with a delivery point to Colorado-Wyoming Gas Co. near Wellington, Colo. Delivery points under the revised plan would be at Cheyenne and Greeley.

The Rock Springs-Denver line will hook into a line proposed by Pacific Northwest Pipeline Co. from the San Juan basin to the Pacific Northwest.

Exploration Program Planned

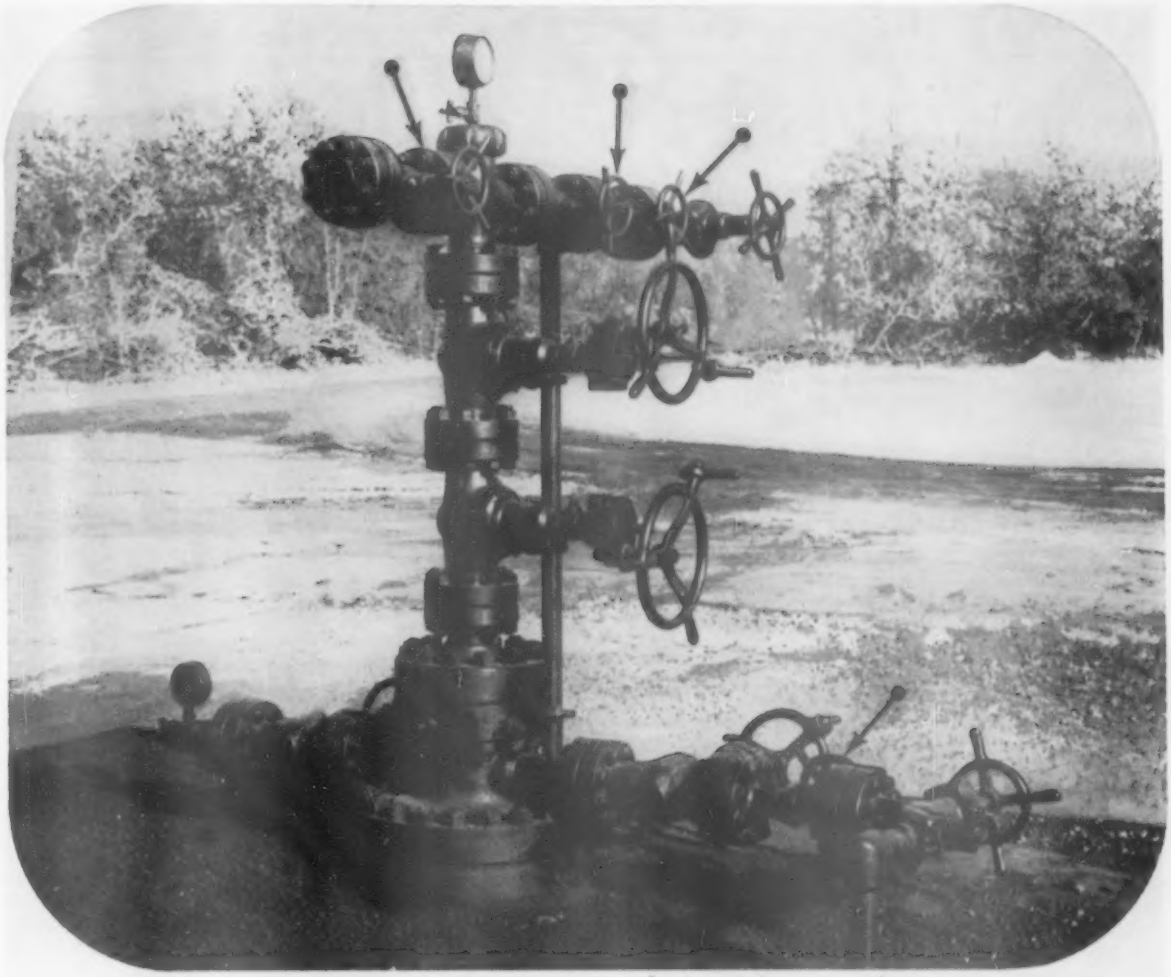
DURANGO, Colo.—Atlantic Refining Co. is moving its exploration office from Albuquerque to Durango to carry out a 5-year program in the San Juan basin of the Four Corners area.

The new office will be under supervision of Ken Carter, geologist.

Shale Mining Interrupted

RIFLE, Colo.—A cave-in has halted mining operations at the Bureau of Mines oil-shale demonstration plant here. A large section of roof, 6 ft. thick in some places, fell in the mine. No one was injured.

Shale mining will remain at a standstill for several weeks, according to Lester W. Schramm, assistant plant manager.



Sure way to avoid Flowdowns

You can't use more economical valves in your production operations than Orbit forged steel Production Valves. They are designed and built for continuous heavy duty service.

Maintenance is reduced to a minimum, even in the roughest service, because the Orbit principle of seating does not require a lubricant to shut-off pressure.

Opening and closing operations are short and easy. Lubrication is only occasionally required, and then but at two points, to insure positive, easy and fast action at all times.

ORBIT VALVES ®

The owner of the above 10,000 pound test surface installation has further availed himself of the savings Orbit provides by using four Orbit Venturi Type 2" x 1" wing valves instead of four full opening 2" valves on the tubing wings. A total savings to the operator, in this instance, of $605.00.

Orbit manufactures a full line of forged steel Production Valves, from 1" to 4"; working pressures starting at 500 pounds WOGL, to and including 5,000 pounds WOGL, both *carbon* trim and *stainless* trim.

Orbit forged steel Production Valves are available through your favorite Well Head manufacturer.

***There is only one* ORBIT VALVE**

ORBIT VALVE COMPANY

P. O. BOX 699 TULSA, OKLAHOMA

Iranian Oil Bids Made

Twelve companies ask membership in consortium; directors of new producing and refining companies in Iran named

WASHINGTON.—A dozen oil companies are trying for membership in the Iranian oil consortium.

Eleven companies reportedly were certified to the state department last week as meeting the requirements for participation. A twelfth, American Independent Oil Co., was seeking to join.

Between them, the group of independents would take up to 40 per cent of the Iranian Oil. The agreement under which the oil is being marketed, however, provides only 5 per cent for independent companies, and these offers will have to be shaved down.

Representatives of the companies met with State Department officials to study the proposed agreement under which they would join and make a final decision as to going ahead.

The 11 companies, it was reported, have been approved by the Iranian Government. But they will have to work as a group and decide the share each is to have. They have 6 weeks in which to work out the details before the offer for independent participation expires.

The companies certified to the department included Anderson-Prichard Oil Corp., 1 per cent; Atlantic Refining Co., 2 per cent; Cities Service Co., 5 per cent; Hancock Oil Co., 3 per cent; Pacific Western Oil Corp., 5 per cent; Richfield Oil Corp., 5 per cent; San Jacinto Petroleum Corp., 1 per cent; Signal Oil & Gas Co., 3 per cent; Sinclair Oil Corp., 3 per cent; Standard Oil Co. (Ohio), 3 per cent; and Tide Water Associated Oil Co., 5 per cent.

Companies organized . . . Four Iranians and five company representatives have been appointed to boards of directors of the two operating companies now handling oil production and refining in Iran.

The two Dutch-incorporated companies are subsidiaries of Iranian Oil Participants, Ltd. The parent company was set up last fall by the eight-company consortium following its agreement with the Iranian Government on reactivation of the Iranian oil industry.

L. E. J. Brouwer, former coordinator of exploration and production at The Hague for De Bataafsche Petroleum Mij. (Royal Dutch-Shell) earlier was named chairman and general managing director of both operating companies.

The producing company is Iranian Aardolie Exploratie en Productie Mij., N. V. (Iranian Oil Exploration & Producing Co.) and the refining company is Iranian Aardolie Raffinage Mij., N. V. (Iranian Oil Refining Co.).

Producing . . . Company representatives named to the board of the producing company are J. J. O'Brien, formerly with The Texas Co., now general fields manager for the Iranian operation; B. Scheffer, general manager of Shell's head office in Teheran; and E. E. Thornloe, technical adviser to the head office in Teheran, formerly with British Petroleum Co., Ltd., London.

The two Iranian representatives on the board, named by the government under terms of the settlement agreement, are: Fathollah Nafisi, and Abolghasem Shiva. Nafisi, a graduate of Birmingham University, worked in Abadan until 1937, later served as director of the concessions department of Finance Ministry, and since 1950 has been director of Iran Oil Co., the government company which has been exploring in central Iran. Shiva, also a graduate of Birmingham University, served at Abadan with Anglo-Iranian Oil Co., Ltd. (now British Petroleum). He later was head of the stores department for the National Iranian Oil Co. and manager of Naft-is-Shah field and the Kermanshah refinery.

Refining . . . Company members of the board of the refining subsidiary are M. Hagen, former employe relations manager of Creole Petroleum Corp. in Caracas; D. L. Hussey, former general superintendent of Esso Standard Oil Co.'s Bayway refinery; and Thornloe.

Iranian Government representatives on the board of this company are Dr. Reza Fallah and Manuchehr Farmanfarmaian. Dr. Fallah, who received a Ph.D. in oil engineering from Birmingham University, was in the chemical department at Abadan prior to the nationalization and later served as manager of the refinery for National Iranian Oil Co. Farmanfarmaian, also educated at Birmingham University, is a former director of the concessions department of the government. In 1954 he served as an oil adviser to the prime minister. His wife is an American, and he has visited extensively in the United States.

Esso Work Started

Company to hike fuel-oil capacity at Fawley plant

A $28,000,000 expansion program to increase fuel-oil production has been started by Esso Petroleum Co., Ltd., at its Fawley refinery in southern England.

The company, a subsidiary of Standard Oil Co. (N.J.), is the first major European refiner to announce plans to increase heavy fuel-oil production.

Additional equipment will be installed to permit a bigger cut of fuel oil to be taken at the company's 146,000-bbl. refinery.

Present production of fuel oil at the Fawley refinery is between 1,500,000 and 2,000,000 tons a year (about 35,000 bbl. daily). During 1955 Esso plans to import another 3,500,000 tons to meet market requirements. The company plans eventually to replace the imports with domestic production.

Demand trends in Europe are marked by sharply increasing consumption of fuel oil, in contrast to the United States where the emphasis is on lighter products.

In London, R. J. Pinder, an Esso director, said recently that the main object of the company's program was to meet increasing demand for industrial energy, particularly during the next 10 years.

A recently published government study entitled "Fuel for Twenty Years" estimates that Britain may need petroleum products equivalent to 75 million tons of coal by 1975.

The survey suggests there may be a surplus of more highly refined products in Britain with the anticipated increase in heavy oil production. "The primary task of refiners is, therefore, to find some outlet for the additional supplies of other products which will come on to the market as a result of meeting the increased demands for fuel oil."

Pravda Slaps Bureau

Red newspaper unhappy with oil management

THE ministry responsible for Russia's oil production has again become the target of criticism by the official government newspaper, Pravda.

The paper blamed oil industry management for, among other things, a lag in drilling and for irregularity of sup-

(Continued on page 102)

Announcing...

A New Bethlehem Product

EXPANDED

LINE PIPE

With the installation of facilities for hydraulic expansion well under way at the Steelton, Pa., plant, Bethlehem Steel Company will soon be able to furnish an unusually wide range of welded, large-diameter line pipe to the oil and gas industries. We invite your inquiries.

HIGH-TEST LINE PIPE

Cold expanded, electric-fusion-weld line pipe meeting API 5LX specifications, in diameters from 18 in. to 36 in. Available in 40-ft lengths and in wall thicknesses to ⅝ in. Bethlehem is also equipped to coat pipe exteriors and interiors.

HIGH-STRENGTH PIPE

Pipe fabricated from alloy steels such as high-strength, low-alloy Bethlehem Mayari R steel plate (50,000 yield). This pipe is immediately available as rolled in 40-ft lengths and in wall thicknesses as required. All diameters from 18 in.

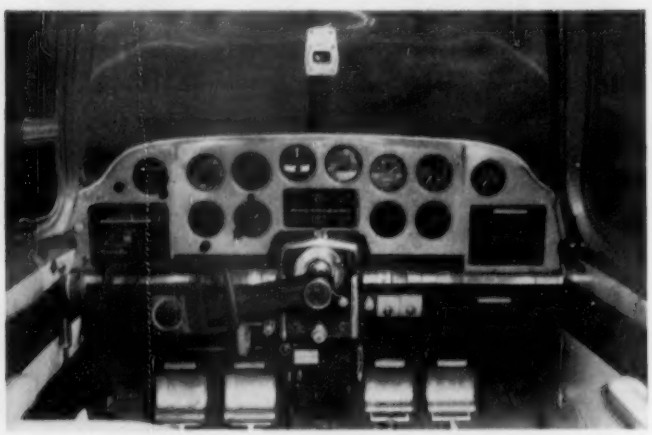
BETHLEHEM STEEL

For further information about Bethlehem Oil & Gas Pipe, please contact the Bethlehem sales office nearest you.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation

SIX windows plus an exceptionally wide windshield provide unexcelled built-in visibility and extra travel enjoyment.



Licensed in the utility category, the Beechcraft Bonanza is the only 4-place airplane capable of passing CAA Utility Category Tests at full gross weights, making it the world's *strongest* 4-place airplane. And it's the *fastest*, too—with cruising speeds up to 184 mph—*the ultimate in private air transportation!*

Owners report that there are *101 Reasons* for the Beechcraft Bonanza Superiority. The four thousand time-tested and service-proved Beechcraft Bonanzas *now at work* for business and industry in all of the 48 states and some 50 foreign countries are proof of the Bonanza's design, structural, and high-performance operating efficiency. Here are a few of the NEW Bonanza features for 1955:

A NEW Additional Window on each side provides even greater visibility, greater safety, and greater comfort.

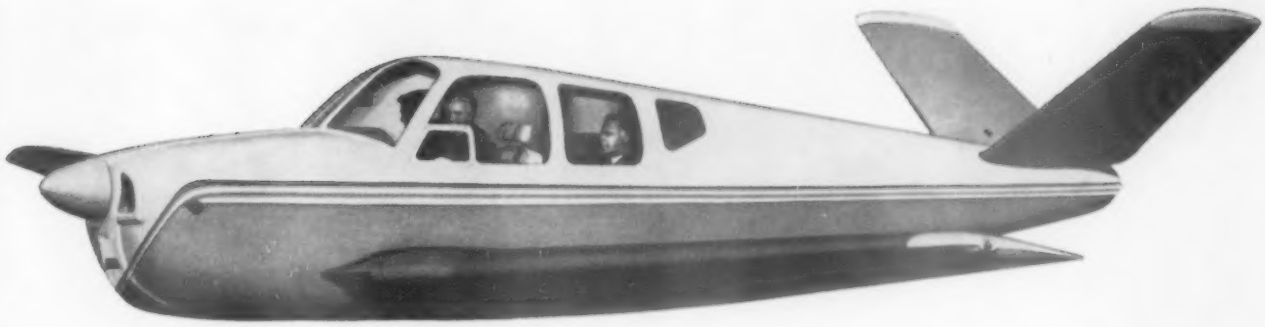
ADDITIONAL Fuel Wing-Tanks, exclusive in the F35 Bonanza, provide ten more gallons of fuel in each wing. When installed, they provide greater range without loss of baggage space.

ADDITIONAL Leg-Room for front-seat passengers now available through a special F35 installation.

COMPLETE Exterior Painting is an exclusive standard feature of the Bonanza. The new F35 designs are offered in a wide array of attractive, durable, and easy-to-see colors.

NEW Interior Styling for the 1955 F35 Bonanza provides the ultimate in design, quality of materials and workmanship. Beechcraft's exclusive safety harness furnished standard in harmonizing colors.

NEW Posture-Ease, Adjustable Seats for the Bonanza provide *the tops* in comfort for all passengers.



INSPIRATION FOR BUSINESS

Beechcraft ownership has been the *incentive to immediate action* on thousands of important business deals... getting there quickly... safely... without fuss of reservations... is inspiration for constructive thinking.

On-the-spot consultation may spell the great difference between being *first* or coming in second. Men with the right answers can reach hard-to-get-to locations with *a fast 184-miles-an-hour Beechcraft Bonanza.* They arrive rested, refreshed, and ready for action.

The right man – with the right answer, at the right place, at the right time – lands the contract. *Beechcrafts* enable busy executives to cover every base of activity – and still handle necessary office routine – with more time for relaxation at home, too.

"Easy to buy – easy to fly – easy to service – that's the reason I purchased my Bonanza," Beechcraft dealers are often told by men who make up the Air Fleet of American Business.

Dependence upon outmoded means of executive travel can be costly. Beechcrafts slash your travel time as much as 75 per cent. *You* make *your* own schedules – on *your* map and travel at *your* convenience. Oftentimes it's possible to land your company Beechcraft at the scene of activity, or within minutes of the important business or pleasure destination.

Built to carry efficiently a useful load of 1,053 pounds, the Bonanza offers more miles per hour per horsepower than any other airplane now manufactured for commercial use. This *Beechcraft* is a plane with *earning power.*

ASK ABOUT BEECHCRAFT'S NEW EXCLUSIVE LEASING PLAN.

BEECHCRAFTS ARE THE AIR FLEET OF AMERICAN BUSINESS

Typical costs, operating data on request from Beech Aircraft Corp., Wichita, Kansas, U. S. A. – or from any of the following Beech Distributors:

Albuquerque—Cutter-Carr Flying Service, Inc.
Amarillo—Tradewind Airport Corp.
Atlanta and Birmingham—Southern Airways Company
Butte—Butte Aero Sales & Service, Inc.
Charleston—Hawthorne Flying Service
Chicago—Butler Airplane Sales
Dallas—J. R. Gray Co., Inc.
Davenport—Elliott Flying Service
Denver—Mountain States Aviation, Inc.
Houston—J. D. Reed Co., Inc.
Indianapolis—Roscoe Turner Aeronautical Corporation
Laming—Francis Aviation
Lantana—Florida Airmotive, Inc.
Memphis—Memphis Aero Corp.
Milwaukee—Anderson Air Activities
Nashville—Capitol Air Sales, Inc.
New Orleans—Magee Aircraft Co., Inc.
New York City—Atlantic Aviation Corporation
Oakland—Pacific Aircraft Sales Company
Oklahoma City—Aircraftsmen, Inc.
Omaha—C. J. Abbott & Co.
Philadelphia—Atlantic Aviation Service, Inc.
Portland—Flightcraft, Inc.
Rochester, Minn.—Gopher Aviation, Inc.
Rochester, N. Y.—Page Airways, Inc.
Salt Lake City—Kemp & Kelsey Airservice, Inc.
San Antonio—Alamo Aviation, Inc.
Shreveport—Currey Sanders Aircraft Company, Inc.
Teterboro and East Boston—Atlantic Aviation Corp.
Topeka—Topeka Aircraft Sales & Service
Tulsa—Tulsair Distributors, Inc.
Vandalia—Ohio Aviation Co.
Van Nuys—Norman Larson Company
Wichita—Aircraftco, Inc.
Wilmington—Atlantic Aviation Service, Inc.
Youngstown—Youngstown Airways, Inc.

plies. Teams of workers wait in idleness for weeks or even months because of the lack of proper equipment, the paper charged.

Ironically, the criticism came only a few weeks after the official press announced that the oil quota for 1954 had been met.

In 1953, Russia produced about 1,015,000 bbl. daily. Since then, both production and exports have increased. Last year the country produced 1,140,000 bbl. daily. The production goal for this year has been set 10 per cent above 1954. Besides shipments to satellite countries, Russia also exported crude oil and some gasoline to Israel, Yugoslavia, France, and Afghanistan.

Spanish Pipeline Ready For Bids

U.S., already biggest pipeliner in Europe, will build products system to serve its five air bases in Spain

Dahl M. Duff

THE United States Government is getting ready to launch a major pipeline construction program in Spain.

It's a part of the plan for building $300,000,000 worth of strategic air and naval bases in the country under terms of the Spanish-United States military agreement.

The pipeline system runs diagonally almost clear across the Spanish peninsula. It will feed aviation fuel and other petroleum products into five air bases under construction.

Bids for the pipeline will be opened March 23, and the contract awarded as quickly as possible afterwards. The entire project must be completed in 425 days. This means the system will be finished the middle of 1956.

The prime contractor for the Spanish base program is Brown - Raymond-Walsh, a group consisting of three big construction companies, Brown & Root, Inc., Houston; Raymond Concrete Pile Co., New York, and Walsh Construction Co., Davenport, Iowa.

Representatives of several United States pipeline firms—Williams Brothers, Tulsa; Benson & Montin, Oklahoma City; and Associated Pipeline Co., Houston—have been in Spain preparing to bid on the job. Bidders must tie up with an established Spanish construction firm in a "joint-venture organization" aimed at giving each group knowledge of local labor and other conditions not requiring major pipeline experience.

The whole Spanish base program is being carried out as far as possible by Spanish contractors. This approach was decided on by the Defense Department in an effort to hold costs to a minimum and avoid charges of extravagance such as happened in the rush construction of bases in French Morocco. However, Spanish contractors have no pipeline experience or equipment, and the joint-venture plan was adopted.

The route . . . The main trunk will extend from Rota, on the Bay of Cadiz

in the southwestern part of the country, to Zaragoza, west of Barcelona. From Rota, where a Navy supply base is being built, products brought by tanker will be pumped 485 miles to the big bomber base at Zaragoza and other American airfields in between.

Pipe for the line, 10-in. in the first section and 6-in. in the final section, has already been bought, and the first shipment is on its way to Cadiz. It is being supplied by Stewarts & Lloyds, a British firm which got the contract against Italian, French, and United States competition. The 38,000-ton order costing $5,250,000 will be delivered over the next few months.

The route of the line leads through varied and in some places mountainous terrain. The winning contractor will be required to see that agricultural areas are disturbed as little as possible. The Spanish Government has declared the line to be a "public utility" and has power to expropriate land for the right-of-way. Under its deal with the United States, all the installations become the property of Spain if for any reason the agreement is terminated.

The system will total 600 miles of line, including four branch lines leading to Seville, Albacete, Torrejon, and Valenzuela. The plans call for six pump stations between Rota and Zaragoza.

The five air bases to be supplied by the pipeline are a large part but not all of the installations being built in Spain under the program. A network of radar stations will be built and Navy supply dumps located at El Ferrol in the northwest part of Spain, and at Cartagena in the southeast. Another Navy supply base will be at Mahon on the Balearic Islands.

One unanswered question is how the military pipeline fits in with the Spanish Government's own refinery and pipeline plans. The government has announced plans to build a refinery at Puertollano, a point on the new military line, and move crude from Cadiz.

The only refinery in Spain of any size is the 45,000-bbl. daily plant at Escombreras. Caltex has about a quarter interest but the majority interest is held by the government.

Other European lines . . . Even before the Spanish program, the United States military was the largest pipeline builder in Europe, both by itself and through its North Atlantic Treaty Organization allies. The NATO system now under construction in eight countries comprises 3,750 miles of line. Some $213,000,000 has already been spent, the lion's share coming from the United States. These lines move products to the dozens of airbases spotted through Western Europe.

Besides this, the U. S. Army has a separate line of its own spanning France from Donges on the Bay of Biscay to Metz near the West German border. The 12-in. line provides six major storage points along the route.

Construction is moving ahead fast on the Donges-Metz line. Except for the tank farms, work is about 95 per cent complete from Donges to a point south of Paris. At Donges, a large 24-in. sea unloading line has been laid; other lines and pumps are almost twice standard size in order to cut the time tankers will be moored for unloading.

U.S. Pipeline Construction in Europe

1. **Spanish products system: 600 miles of 10 and 6-in. line. Bids to be opened March 23.**
2. **NATO system: 3,750 miles of line in eight European countries now under construction.**
3. **U. S. Army line: 12-in. line spanning France from Donges to Metz. Now under construction.**

FIXAFRAC SEALED UNPRODUCTIVE ZONE TO MAKE ACIDIZING EFFECTIVE

Temporary plugging service by DOWELL helped increase production from 0 to 188 BOPD

A new well in a limestone formation failed to produce oil in commercial quantities even after an acidizing treatment.

Dowell engineers, called on the job, recommended and performed a second acid treatment, using a Fixafrac* temporary plug ahead of the acid. Following the treatment, the well flowed 188 barrels of oil per day.

Fixafrac—exclusive with Dowell—is used to prevent the entry of acidizing and fracturing fluids into unproductive, depleted, or previously treated zones of the pay formation. The material used carries suspended solids which react after a short time causing the Fixafrac to liquefy and flow back freely to the well bore.

Dowell engineers perform these treatments using the latest techniques, modern tools and high-pressure, high-volume equipment.

For more information about Fixafrac or any of the many Dowell oil field services, call Dowell today or write DOWELL INCORPORATED, Tulsa 1, Oklahoma, Dept. C-11.

A registered service mark of Dowell Incorporated

services for the oil industry

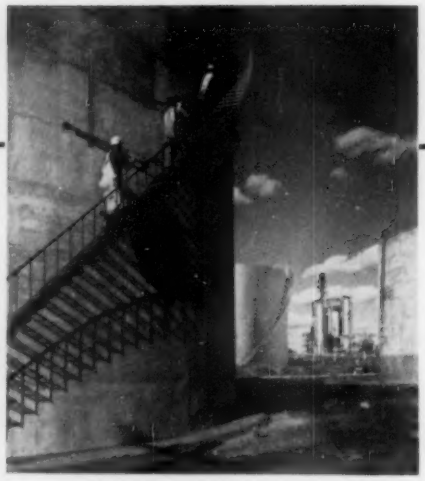
DOWELL

A SERVICE SUBSIDIARY OF THE DOW CHEMICAL COMPANY

The rising costs of

Oil Storage Tanks

...and how to effect economies by proper selection, sound construction, efficient upkeep, and timely retirement



by C. V. Lynn

PART 1

PROBABLY three-fourths of Sinclair's total refinery properties are occupied by facilities for storing and handling liquid products. A simple addition of refinery tank lists indicates a grand total of over 26 million barrels gross storage capacity and this is being continually increased. The replacement cost of this tankage, the value of the real estate, foundations, dike walls, and auxiliary equipment all amount to a tremendous capital investment, while the value of the stored products may be much greater.

Aside from the more or less fixed charges for interest, insurance, and taxes, the annual expense of maintaining these facilities and protecting products against loss is subject to some control. Therefore, economies which can be effected by proper selection, sound construction, efficient maintenance, and timely retirement of tankage, are vital factors in operating costs.

This article is devoted to those factors bearing upon reduced annual expense. A brief review of some of the elements of design and construction is pertinent since we are concerned with over-all economy which also involves the integrity of structures and the safety of investment.

Author is in central engineering department, Sinclair Refining Co., East Chicago, Ind., also chairman, A.P.I. Committee on Standardization of Tanks for Oil Storage.

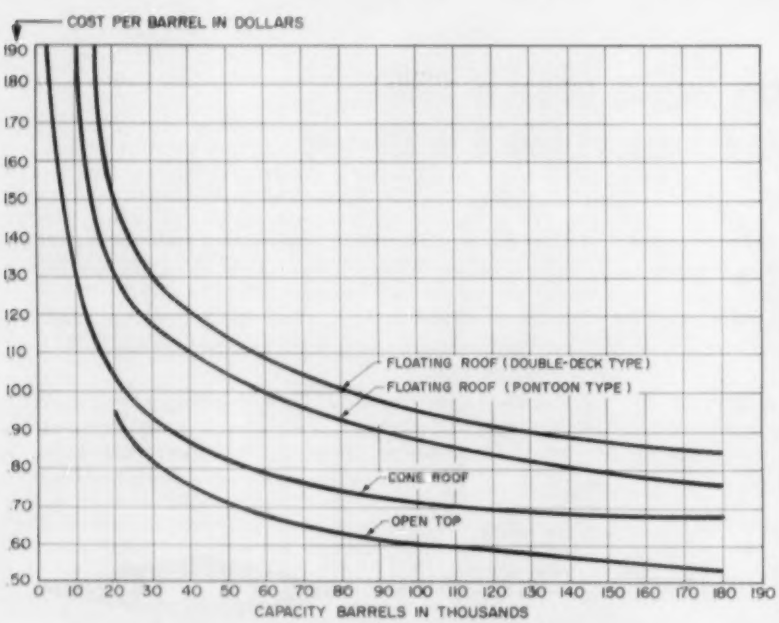
While storage tanks are big, simple-appearing structures, a considerable amount of engineering thought and manufacturing technique have gone into their development to make them efficient and safe.

The unit stresses used in design exceed those used for carbon-steel pressure vessels. The materials used are not as select. There is seldom any allowance for corrosion. The inspection and testing procedures are not as rigid. The safety factor is considerably less, yet the consequences of failure of a large tank could be just as disastrous as the failure of a pressure vessel.

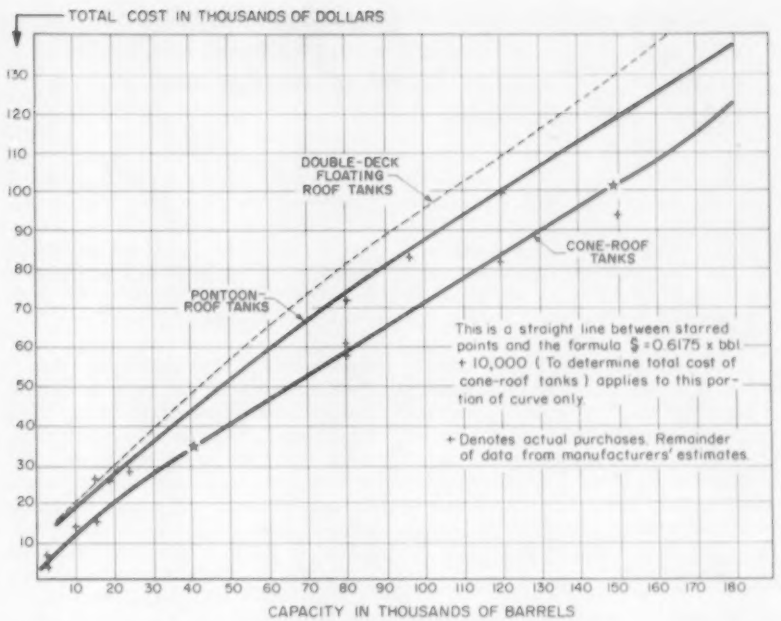
Inspection important . . . While there have been no serious failures of tanks built in the United States and strictly in accord with A.P.I. 12-C Specifications, some tank failures abroad, failures of welded ships, and recent studies of the phenomenon of brittle fracture and notch sensitivity have emphasized the need for extreme care in some of the details of construction and repair and the importance of thorough inspection.

While the integrity and skill of the fabricator and erector are the most important factors in the quality of a job it is suggested that the purchaser has some responsibility and should furnish competent inspection of his own or some independent agency.

Revised A.P.I. standards and Sinclair specifications reflect the results of some of this study in certain restrictions on materials; a little closer attention to fabrication details; provisions for nondestructive tests such as random radiography and magnetic particle testing; and some recommendations relative to tank foundations. It becomes increasingly apparent that more care should be used in making repairs and field installations of appurtenances.



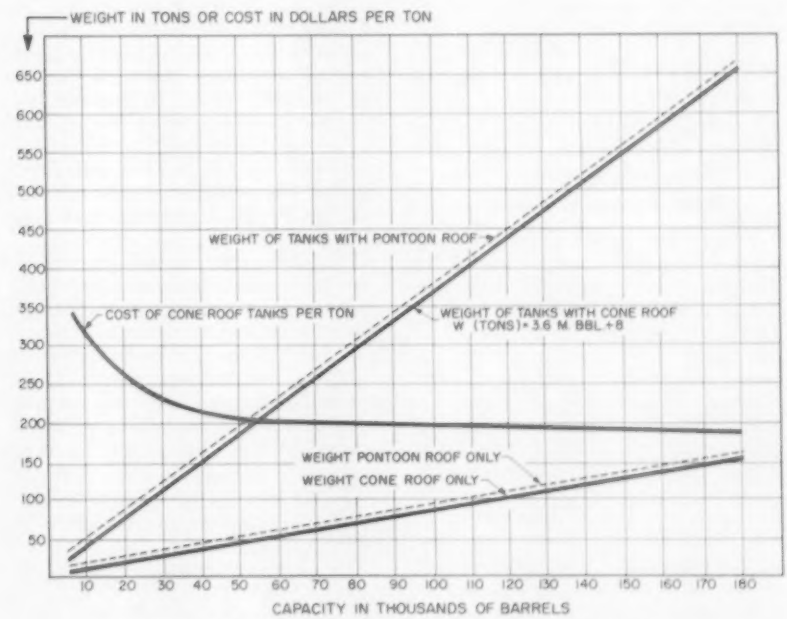
COSTS of new oil-storage tanks in dollars per barrel. Fig. 1.


TOTAL COST IN THOUSANDS OF DOLLARS
DOUBLE-DECK FLOATING ROOF TANKS
CONE-ROOF TANKS
PONTOON-ROOF TANKS
This is a straight line between starred points and the formula $ = 0.6175 x bbl + 10,000 (To determine total cost of cone-roof tanks) applies to this portion of curve only.
+ Denotes actual purchases. Remainder of data from manufacturers' estimates.
CAPACITY IN THOUSANDS OF BARRELS

TOTAL COSTS of new oil-storage tanks, based on actual purchases and manufacturer's estimates. Fig. 2.

Better foundations . . . There is great need for better tank foundations and grades. Many older tanks are bogged down in mud holes where bottom shell rings are being damaged by corrosion. It is impossible to keep this area painted and the service life is being shortened. Storage tanks should have a suitable concrete foundation with a sand or gravel fill. The foundations should be at least 1 ft. above the surrounding grade to keep the tank out of the mud and to provide a dry bottom. The grade must be well compacted and crowned to compensate for some settlement and to facilitate cleaning.

There should be a graveled ring or berm around the foundation to prevent erosion and to keep the grass and weeds away. The concrete ring wall or slab should be held to close tolerances and when the tank is completed some record of elevations should be taken at several points around the foundation in order to accurately determine the amount of settlement which may occur. This may later avoid argument if any shell rings are buckled during or after construction or if a floating roof does not function properly. The foundations of any building that cost $100,000 would receive a lot of consideration. A tank that costs as much and may hold $1,000,000 worth of flammable product should not receive less.


WEIGHT IN TONS OR COST IN DOLLARS PER TON
WEIGHT OF TANKS WITH PONTOON ROOF
COST OF CONE ROOF TANKS PER TON
WEIGHT OF TANKS WITH CONE ROOF W (TONS) = 3.6 M. BBL + 8
WEIGHT PONTOON ROOF ONLY
WEIGHT CONE ROOF ONLY
CAPACITY IN THOUSANDS OF BARRELS

WEIGHTS AND COSTS for cone-roof and pontoon-roof tanks. Fig. 3.

Types Available

The papers presented at the November 1952 A.P.I. symposium on evaporation losses made it clear that the selection of any particular type of tank for a particular service with optimum economy is an individual problem.

Sinclair, with some exceptions, has generally built tanks with cone roofs or the several types of floating roofs for liquid storage. The cone-roof tank is familiar to all and needs little discussion except in connection with accessories and costs.

Floating roof . . . Of the floating roof there are several types, pan, single-deck pontoon, and the double deck. All of these are basically the same in that they are installed in open-top tanks and float on the oil with some kind of vapor-seal arrangement between the shell and movable roof. They differ somewhat in details. It is desirable to have a fairly clear understanding of these differences and to be sufficiently specific in inquiries and requests to insure getting what is wanted and to make an intelligent choice of those offered.

The floating roofs which Sinclair usually purchases are either the double deck or some variety of the single-deck pontoon roof. The company has a few old pan roofs here and there, and while they are cheaper in first cost than other types, it is doubtful that any more will be purchased for general use because of their instability and other disadvantages.

The double-deck roof has a top and bottom deck plate over the entire roof, separated by an air space divided into liquid-tight compartments. Its principal advantages are: (1) considerable strength and structural stability; (2) fair surface drainage; (3) center or low part of the upper deck is practically always above the liquid level of the tank; (4) it will support a large weight of snow and ice but has a low storage capacity for rain water; (5) barring serious accident it is practically unsinkable. It usually costs more than other types.

Pontoon roof . . . The single-deck pontoon roof has a single plate deck surrounded by a circular chamber or pontoon divided into compartments. Some

have an additional pontoon in the center while another type has a large center weight to provide a better drainage slope which is otherwise flat and may even be high in the center. The only advantage of the single-deck roof over the double deck seems to be that it is cheaper in sizes over approximately 10,000 bbl.

The roof is flexible and not as strong as a double deck, will not safely carry the same load of snow and ice, and has a large water-storage capacity. The deck plate in the center portion is usually flat and the drainage is very poor. It is difficult to keep this portion painted. Since the center of the deck is below liquid level, under some conditions the tank contents can back up onto the roof unless a hose or pipe drain is used. It does not have the same factors of safety as the double-deck roof.

A subtype of pontoon roof has a vapor space under a portion of the single deck. The purpose of this construction is to provide a steeper slope than is otherwise obtainable in the ordinary single-deck roof. It also offers a variable volume space for vapors trapped or generated under the deck.

The better drainage slope is somewhat offset by the condition around the center pontoon in roofs of large diameter where water is supposed to flow around the valley to the drain but often does not. The vapor space under this roof is at times a disadvantage since corrosion of the underside of the deck is more likely to occur here if sour products are stored. The cost of this roof is not much different from other single-deck pontoon roofs.

No data are available for comparing vapor loss from double-deck and pontoon roofs, but it seems doubtful that there is any material difference. Under conditions of surface boiling the single-deck roof has a bubble of vapor which is probably as effective insulation as the air space of the double deck. Therefore, the double-deck roof must pay off in greater safety, less painting, a better maintenance record, and longer service life to justify its extra cost.

Cost of New Tanks

Cost curves for new tanks are plotted in Figs. 1 and 2. Costs include erection but not foundations, dikes, or piping. Some of the figures were submitted by various manufacturers for estimating purposes while others represent actual bid or purchase prices from 1951 through 1953.

In plotting these curves a little more weight was given to those values representing actual purchases. The curves at best only approximate average conditions and costs of tanks of normal proportions. There are a number of variable factors affecting costs such as geographical location, climatic and field conditions, labor and material costs, the size of job, and the competition. However, they do point to some trends which might govern our selections.

"It is quite apparent that, if consistent with manufacturing and operating conditions, the largest tanks are the most economical. Cost per barrel of storage rises sharply, below about 40,000 bbl."

It is quite apparent that, if consistent with manufacturing and operating conditions, the largest tanks are the most economical. The cost per barrel of storage rises sharply below about 40,000 bbl. so as to make small tanks uneconomical unless they are limited to small capacity by operating conditions and the amount of product available for storage.

Small sizes . . . In the smaller sizes there is a tendency toward a convergence in the costs of double-deck and single-deck pontoon roofs. This is supported by information from manufacturers that below about 10,000 bbl. there is not a great deal of difference.

There also seems to be a slight tendency toward convergence in costs of the pontoon and the cone roofs in larger sizes. In some cases it may be found that a pontoon roof costs little or no more than a cone roof. If we take into consideration the venting equipment and other cone-roof appurtenances and the fact that the underside with all of its framing is particularly vulnerable to corrosion, the advantage of the floating roof is more apparent.

Fig. 3 is a graph showing weights of various types and sizes and the cost in dollars per ton of cone-roof tanks. These weights were taken from manufacturers' published data for tanks having average diameter-height ratios.

Other Factors in Selection

There are no standards for tank sizes either of manufacturers or the A.P.I. Manufacturers will construct any diameter or height that the customer wants. There are, however, some factors of size which affect price to a minor extent and should be considered when ordering. The selection of diameter is limited only by capacity desired and ground space. The choice of tank height is generally limited by available pumping head, the supporting capacity of the soil, and economics of plate widths.

In the latter case plates ¼ in. and thicker are readily available in 8-ft. widths and $\frac{3}{16}$-in. plates in 6-ft. widths. Wider plates can be obtained but the size extras may make them uneconomical. Manufacturers say that the most economical tank height is usually one using multiples of these stock widths and that for small tanks the height and diameter should be about the same if consistent with this selection of plate width and the other factors.

Tank height . . . The supporting value of the tank grade, of course, is a variable but for foundations without piling 3,000 lb. per sq. ft. seem to be a conservative value. Since this is the weight of 48 ft. of water it limits tank heights unless the ground is unusually good or unless piling or some other type of deep foundation is used. There are locations where 48 ft. would be excessive particularly where a large-diameter tank is to be constructed or a number of closely spaced smaller ones. Some caution should, therefore, be observed in choosing tank height.

In purchasing a floating-roof tank it should be remembered that, due to roof displacement, the full capacity of a cone roof tank of equivalent dimensions is not obtained. If this full capacity is important it should be clearly specified in the inquiry and order and the proposed design examined for this feature.

Roof skirts . . . If tanks with floating roofs are to be frequently operated at full capacity it may be desirable to provide a skirt plate or extension all around and above the normal shell rim in order to contain the seal shoe and provide a better seal against evaporation due to windage when the tank is full. Without such a device the seal shoes are projecting above the tank and the area in contact with the shell below the liquid level is much reduced. If the roof has a secondary seal it is also inoperative and in some cases may be damaged when the roof descends.

This skirt plate or shell extension must have slotted holes or openings of some sort all around at the design height of shell. Otherwise if the liquid level rises above this point the lower shell rings will be overstressed. There is some objection to the use of this skirt plate with slotted holes or openings on the basis that the tank is more likely to be overrun since the seals are below the top and invisible. The validity of the objection depends upon the methods of operation.

Part 2 of this paper will appear in an early issue. It will deal with fittings and attachments, painting and other maintenance, inspection, and retirement.

ELEMENTS OF FIELD PROCESSING . . . **Part 1 of a Series**

Know Your Separators

. . . They are the key to field processing

If separators are properly sized and operated, the loss of oil and rich vapors will be held to a minimum. More oil and higher gravity mean more money for the producer. The series that starts with this article is intended to show the operator how to choose and operate his separators and other field-processing equipment for maximum profit. The next few articles will show the effect of pressure and temperature on separation, application of stage separation, and how to get top efficiency from other operations.

by John M. Campbell

SEPARATION of oil and gas is the most critical of the field-processing operations although it is still the most common. As producing pressures have risen and lighter condensates are produced, efficient separation has become more critical than ever. Moreover, some of the new concepts have been applied to advantage on old leases producing oil at moderate pressures.

As gas-transmission lines raise their standards, separation becomes a part of the over-all field processing necessary properly to condition the gas. Consumer specifications are becoming more rigorous; it is only a matter of time, probably, until most gas contracts will specify dust and liquid content in addition to the present requirements.

Separation requirements . . . A "complete" separator must have the following:

1. A primary separation section to remove the bulk of the liquid from the gas.

2. Sufficient liquid capacity to handle surges of liquid from the line.

3. Sufficient length or height to allow the small droplets to settle out by gravity, to prevent undue entrainment.

4. A means of reducing turbulence in the main body of the separator so that proper settling may take place.

5. A spray condenser to capture entrained droplets or those too small to settle by gravity.

6. Proper back-pressure and liquid-level controls.

Author is with department of petroleum engineering, University of Oklahoma.

All separation may be divided into two classes—scrubbers and separators. This classification is loose, and is only to distinguish that equipment having all the above features from that which does not. In this nomenclature, a scrubber is any device designed for separation of liquid from gas that does not have features (2) and (3), and possibly (6). It is a vessel, then, designed to handle relatively small quantities of liquid with no large degree of surging.

Choice of the separation device obviously hinges on economics. By virtue of its smaller size and simplicity, a scrubber is cheaper in initial cost and easier to install. Use of scrubbers should be carefully examined to see what ultimate effects liquid carryover might have on operations downstream. Such an examination often reveals that the slight additional cost of a separator is indeed very cheap insurance.

It is poor practice to use a scrubber as the primary separation means at the well. Production of liquid is often unsteady and there is a definite need for liquid surge capacity. Even dry-gas wells will often start producing liquid, including salt water, during their later life. Consequently, scrubbers are recommended only for:

1. Secondary separation to remove carryover fluids from process equipment such as absorbers and liquid dust scrubbers.

2. Gas-line separation downstream from a separator and where flow lines are not long.

3. Miscellaneous separation where the gas-liquid ratio is extremely large.

Types of separators . . . The separators of various manufacturers differ slightly in details, but all may be subdivided into (1) vertical, (2) horizontal, and (3) spherical. The spherical type is a fairly recent addition, having been offered by some manufacturers for competitive reasons. Although it embodies all features of conventional separators, it has limited liquid surge capacity and separation space. According to the nomenclature used here, it would fall on the line between a scrubber and a separator. Its use appears limited to small leases, operating at moderate pressure, where initial investment is considered important.

Table 1 summarizes the advantages and disadvantages of each type. Operating data on the spherical type are limited so a final evaluation is difficult.

Table 1 shows that the vertical-type separator is the most versatile but the most expensive. Consequently, its use must be justified by actual operating requirements or by that intangible "operating insurance." On the average lease, the extra cost of a vertical separator, particularly in the smaller sizes,

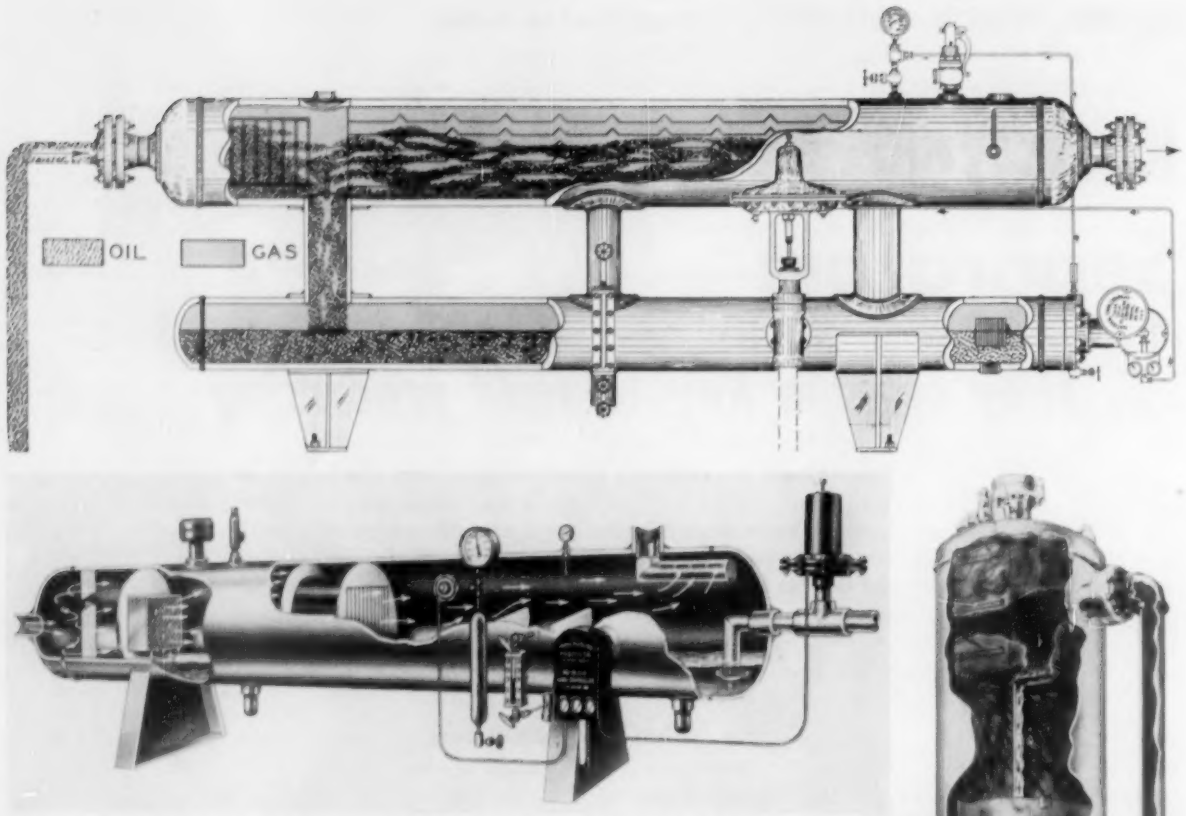


Fig. 1—A double-barrel horizontal separator above and a single-barrel below. The main advantages of this type are low cost and ease of mounting and piping.

is negligible when compared to the total well cost. Where the gas-oil ratio is low, the vertical type is always recommended.

Separator components . . . Figs. 1 and 2 are typical cutaway views showing the various separator parts.

Primary separation is normally accomplished with the aid of centrifugal force. Either a tangential inlet or internal piping is used to cause a spinning motion of the incoming gas. The latter is preferred by most since it permits in-line piping. With this approach, the large liquid droplets are thrown against the walls, which limits the upward flow and reduces entrainment.

All standard separators have capacities based on nonsurging of fluids. However, experience has dictated that such surge capacity be built in. There is no way of determining the necessary surge capacity as the degree of surging can never be known in advance. Consequently, the amount of capacity has to be a compromise between cost and the average process requirements.

TABLE 1—SUMMARY OF SEPARATOR OPERATING CHARACTERISTICS

Type	Advantages	Disadvantages
VERTICAL	Liquid level control not quite so critical. Will handle larger quantities of sand and mud without foiling. Easier to clean out. Has greater liquid surge capacity as usually manufactured. Less tendency for revaporization of liquid.	Most expensive. On skid assemblies more difficult to ship. Takes larger diameter for a given gas capacity.
HORIZONTAL	Cheaper than vertical. Easier to ship on skid assemblies. Easier to pipe up. For a given gas capacity diameter smaller than vertical.	Liquid level control more critical than with vertical type. Difficult to clean of mud, sand and paraffin. More area available for settling when two liquid phases are present.
SPHERICAL	Cheaper than either horizontal or vertical. Compact.	Has limited separation space and liquid surge capacity. Liquid level control critical.

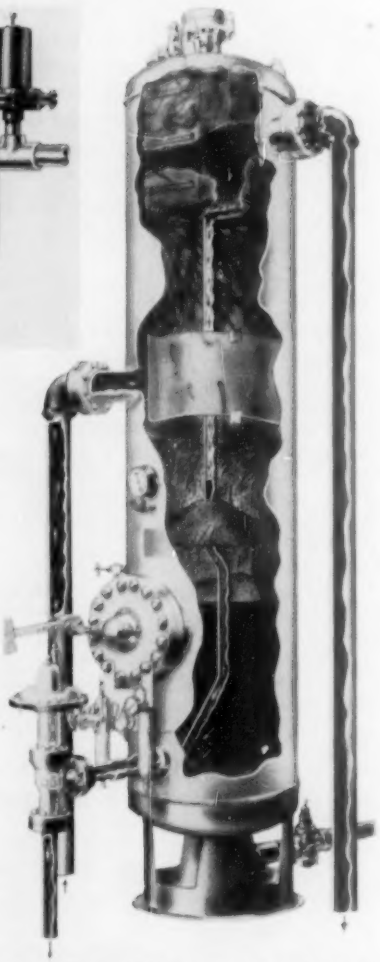


Fig. 2—A vertical separator. Its advantages are ease of cleaning, lack of revaporization and ability to handle liquid surges and large volume of sand.

Standard-size separators, produced by reputable manufacturers, have very similar dimensions; and all have, in effect, incorporated an arbitrary amount of surge capacity. In many cases, particularly with the vertical type, shorter

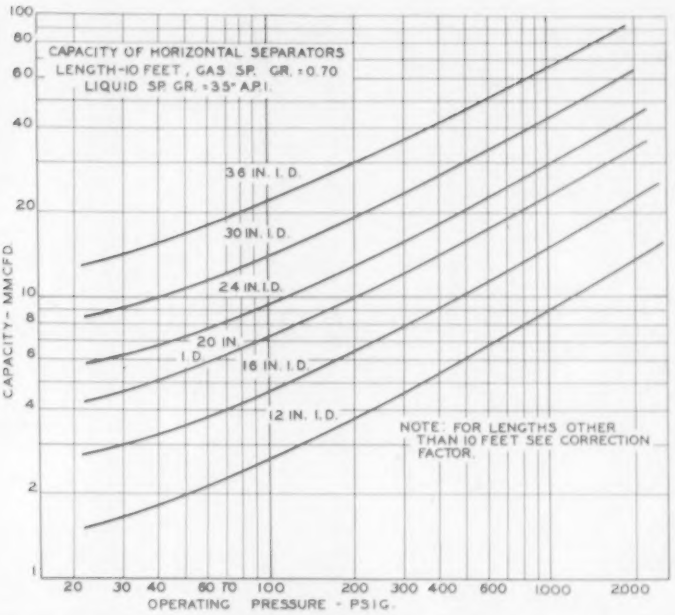

CAPACITY OF HORIZONTAL SEPARATORS
LENGTH-10 FEET, GAS SP. GR. = 0.70
LIQUID SP. GR. = 35° API.
36 IN. I.D.
30 IN. I.D.
24 IN. I.D.
20 IN. I.D.
16 IN. I.D.
12 IN. I.D.
NOTE: FOR LENGTHS OTHER THAN 10 FEET SEE CORRECTION FACTOR.
CAPACITY - MMCFD
OPERATING PRESSURE - PSIG.

Fig. 3—These curves are based on a 10-ft. length, but at higher pressures a longer separator may be cheaper.

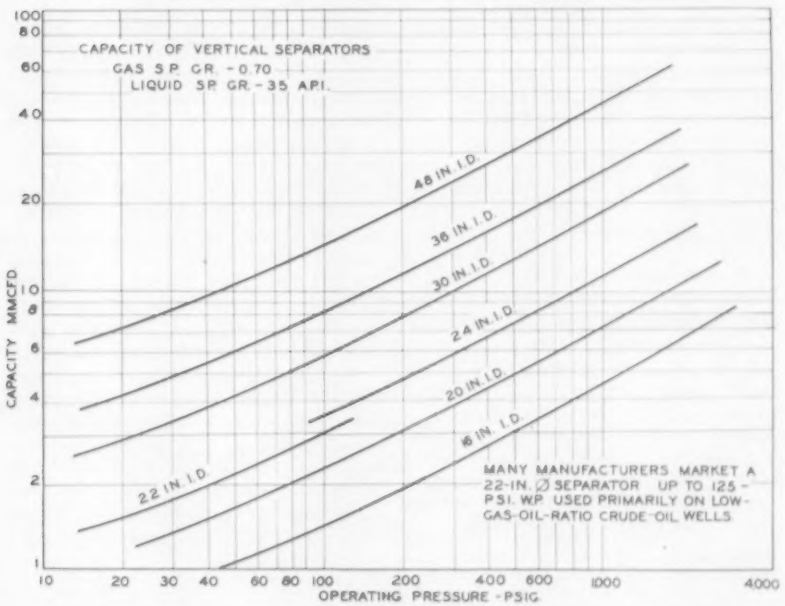

CAPACITY OF VERTICAL SEPARATORS
GAS SP. GR. - 0.70
LIQUID SP. GR. - 35 API.
48 IN. I.D.
36 IN. I.D.
30 IN. I.D.
24 IN. I.D.
20 IN. I.D.
16 IN. I.D.
22 IN. I.D.
MANY MANUFACTURERS MARKET A 22-IN. Ø SEPARATOR UP TO 125-PSI. WP. USED PRIMARILY ON LOW-GAS-OIL-RATIO CRUDE-OIL WELLS.
CAPACITY MMCFD
OPERATING PRESSURE - PSIG.

Fig. 4—A difference of 2 ft. between oil inlet and outlet is considered in these curves. With less, there may be undue entrainment.

separators have proved entirely satisfactory.

The length of a horizontal separator has a greater effect on capacity than the height of a vertical type. In the horizontal vessel, the path of any droplet ideally has a trajectory similar to that of a shell from a gun. Therefore, the length necessary depends on:

1. Droplet size.
2. Gas velocity.
3. Droplet density.
4. Vessel diameter.
5. Degree of turbulence.

In the ideal case, turbulence may be neglected and effect of gravity assumed constant. Droplet velocity affects length for as it increases, the droplets will travel farther before settling out. Although corrections have to be made for the nonideal conditions that exist, this analysis shows that the capacity of horizontal separator of a given diameter may be increased by increasing length.

Application of the same principles to vertical separators shows slightly different results. There, the droplet velocity is working against gravity, which makes separation more difficult. In order to keep separator height reasonable, velocities must be smaller. Sufficient length is needed only for the velocity to become zero and for the droplet to start falling. Increasing the length above this point accomplishes little good.

If too much liquid is carried into the separation section, the falling of the small droplets is hindered and entrainment becomes more prevalent. This is one reason internal design is critical. Theory does not give the designer sufficient tools, so design is best accomplished by actual test.

The spray condenser is designed to trap those droplets that have for any reason been carried beyond the separation section proper. This subject will be explored more thoroughly at a later date.

Single and double barrel . . . The horizontal separator in Fig. 1 is known as the double-barrel type and consists of an upper separation section and a lower liquid chamber. The single-barrel type combines both into a single chamber. A difference of opinion exists as to which is the best as each has its inherent advantages. Either should work satisfactorily if properly designed and used within its limitations. In many cases, initial cost is the prime consideration. Table 2 summarizes the advantages advanced for each type.

To prevent undue liquid turbulence and reentrainment of liquid, most manufacturers provide some sort of baffle plate above the liquid level on the single-barrel type. To have a gas capacity equivalent to that of a double-barrel type, the diameter must be larger to compensate for the volume occupied by the liquid.

Sizing of Separators

Since theory does not take some important factors into account, published separator capacities have been obtained by test and the application of rather arbitrary standards.

Gas capacity . . . For many years designers have used variations of the empirical formula:

$$Q = 65{,}824\ CD^2 Z\ (P/P_s) \times [(\rho_L - \rho_g)/\rho_g]^{1/2} \qquad (1)$$

to determine the gas capacity of separators, where:

Q = gas capacity, standard cu. ft. per day
C = proportionality constant
D = internal diameter of separator, ft.

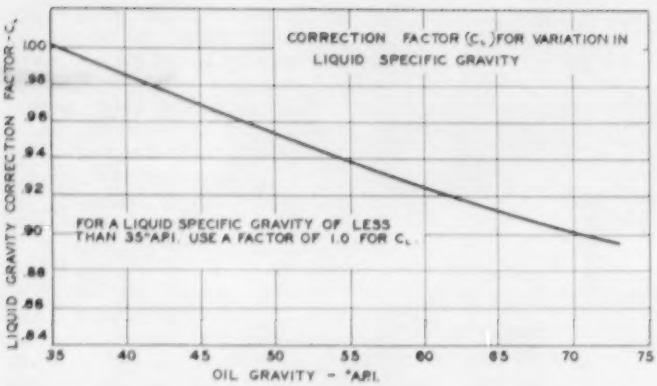


Fig. 5—Once the capacity of a horizontal separator of a given length is known, the capacity for any other length can be found. The C_L factor corrects for oil gravity.

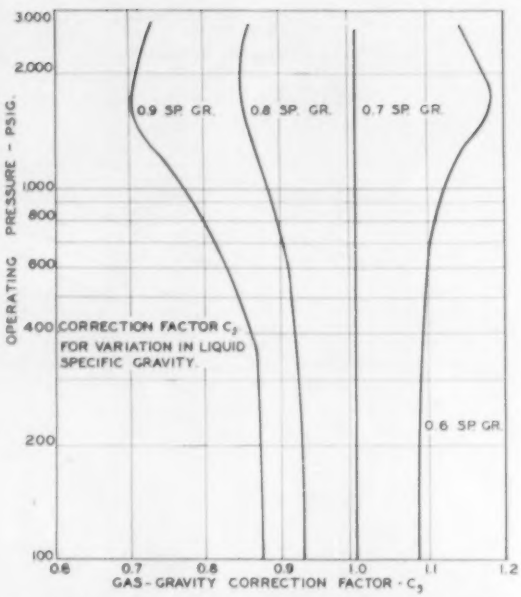


Fig. 6—If the gas gravity is not 0.70, the C_G factor from this chart will help to find capacity of a horizontal separator.

Z = compressibility factor, dimensionless

P = operating pressure, psia.

P_s = pressure base, psia.

ρ_L = density of liquid, lb./ft.^{3}

ρ_g = density of gas, lb./ft.^{3}

Use of Equation 1 in a vertical separator stems from analogy with allowable vapor velocity in fractionation columns and absorbers. Consequently, a value of $C = 0.16$ to 0.18 is often used. For horizontal separators the same equation has been used with $C = 0.40$ to 0.42.

In absence of detailed capacity charts, Equation 1 may be used for estimating separator size requirements. Many calculators assume ideal gases ($Z = 1.0$) for sizing calculations, particularly at pressures below 1,000 psig. An additional temperature correction could be shown; but in most separation processes, it is not significant except for its effect on liquid and gas gravities.

At least one reputable manufacturer bases sizing curves on the following conditions:

1. Smallest liquid particles separable are spheres 10 μ (0.0004 in.) or larger in diameter.
2. The specific gravity of the liquid particles in the gas stream is 45° A.P.I. or less.
3. No liquid foaming is present and there is no undue surging.
4. The oil is at a temperature above its cloud point.
5. The gas is above the hydrate forming temperature.
6. The gas has a specific gravity of 0.7 and the separated oil is 35° A.P.I.

Using these assumptions, the entrainment of liquid through the separator is guaranteed not to exceed 1 gal. per 1,000 standard cubic feet.

A means of estimating separator gas capacity is provided by Figs. 3-6. Figs. 3 and 4 are actually a conservative composite of various manufacturers' curves and check Equation 1 rather closely. In these figures, internal diameter is used as a parameter. Many manufacturers base separator sizes on the outside diameter so that a correction for wall thickness would be necessary. This is easily done for from Equation 1 it may be seen that Q is proportional to D^2 for a given well stream, at given separation conditions. Consequently,

$$Q_1 = Q_2 (D_1^2/D_2^2) \qquad (2)$$

where

Q_1 = capacity desired for a separator with i.d. D_1

Q_2 = known capacity for a separator with i.d. D_2

The vertical separator capacities shown in Fig. 4 are based on the use of a tangential inlet (or the equivalent) and at least 2 ft. difference in height between the oil outlet and inlet. Many designers feel that a minimum of 2 ft. is required to prevent undue entrainment as a result of turbulent effects.

The horizontal separator capacities shown in Fig. 3 are based on separators 10 ft. long with the equivalent diameter shown being entirely available for gas flow. For single-barrel separators, that portion occupied by liquid should be subtracted from the total area to find an equivalent diameter.

At high pressure it is less expensive to build longer separators because of the saving in the thickness of shell plate used, which in turn reduces fabrication costs. Published data show that the following equation may be used for estimating the capacity at any length once the capacity for some other length is known:

$$Q_1 = Q_2 (L_1/L_2)^{0.56}$$

where

Q_1 = capacity of separator of length L_1

Q_2 = capacity of separator of length L_2, with same diameter as L_1

When using Fig. 3, Q_2 would equal the capacity read from the graph and $L_2 = 10$ ft.

For those cases where the gas and liquid gravities are different from 0.70 and 35° A.P.I. respectively, it is necessary to use Figs. 5 and 6. Fig. 5 is a plot of correction factor versus oil gravity in °A.P.I., while Fig. 6 gives a corresponding correction factor for gas.

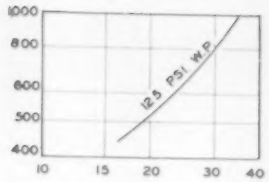
TABLE 2—SUMMARY OF ADVANTAGES CLAIMED FOR SINGLE AND DOUBLE BARREL HORIZONTAL SEPARATORS

Single barrel:

1. Lower first cost.
2. Easier to insulate for cold weather operation.
3. Gas and liquid remain in contact, keeping the liquid warmer and minimizing freezing and paraffin deposition.

Double barrel:

1. Under surging conditions larger capacity with less upset by diverting bulk of liquid to lower chamber at inlet. The separation section is semi-isolated from the effect of such surges.
2. Better separation of solution gas is obtained in the quiescent lower chamber.
3. Better separation when gas and liquid have similar densities, as at high pressure.
4. Less chance for reentrainment.
5. More stable liquid level control as the float is located away from the turbulent gas-separation section. Level control is not quite so critical.



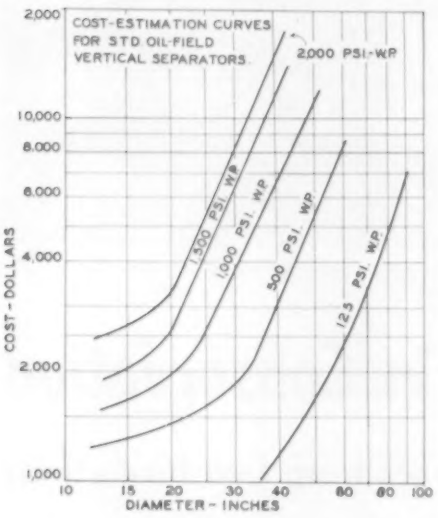


Fig. 7—A fair estimate of first cost of vertical oil-field separators can be made from these curves.

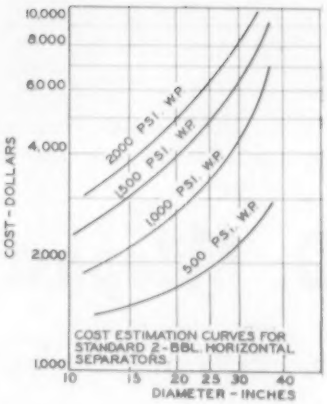


Fig. 8—If it were not for the different cost of fittings, all these curves would meet at some small diameter.

The total capacity of a separator is then found from the equation

$$Q_T = (Q)\ (C_g)\ (C_L) \qquad (4)$$

where

Q_T = capacity at actual conditions
Q = capacity read from Fig. 3 or 4
C_g = gas correction factor from Fig. 6
C_L = liquid correction factor from Fig. 5

Example: Determine the gas capacity of:

(a) 30-in. i.d. vertical separator
(b) 30-in. i.d. horizontal separator, 10 ft. long
(c) 30-in. i.d. horizontal separator, 20 ft. long

when processing a well stream containing 0.80-sp. gr. gas and 50° A.P.I. liquid, separating at 800 psig.

Solution:

(a) From Fig. 4 gas capacity = 16.6 M.M.c.f.d.
From Fig. 5 $C_L = 0.952$
From Fig. 6 $C_g = 0.90$
$Q_T = (16.6)\ (0.952)\ (0.90) =$ **14.2 M.M.c.f.d.** (from Equation 4)

(b) From Fig. 3 gas capacity = 39.0 M.M.c.f.d.
From Fig. 5 $C_L = 0.952$
From Fig. 6 $C_g = 0.90$
$Q_T = (39.0)\ (0.952)\ (0.90) =$ **33.4 M.M.c.f.d.**

(c) $Q_2 = 33.4$ M.M.c.f.d. and $L_2 = 10$ ft.
$L_1 = 20$ ft.

From Equation 3

$Q_1 = (33.4)\ (20/10)^{0.56} = (33.4) \times (1.47) =$ **49.1 M.M.c.f.d.**

Liquid capacity . . . Liquid capacity is limited by two factors—liquid capacity of the downcomers and other liquid handling portions of the vessel, and/or capacity of the liquid-level control valve. Since there are infinite combinations of these, no general correlation of liquid capacity is feasible.

As the pressure increases, the capacity will do so correspondingly because more driving force is available to force the liquid through the vessel and across the valve. However, no effective change in capacity is usually specified after the pressure exceeds 1,000 psig.

One method of increasing separator capacity is the use of a larger stem and seat in the dump valve. This should be done with caution, though, for many control complications may arise. This aspect will be discussed in detail in a future installment.

A large majority of those separations, where the liquid capacity is governing, are on low-pressure crude-oil wlls. As a guide the following capacities are given by one manufacturer for 125 psig. working pressure vertical separators.

Diameter (in.):	Dump valve size (in.)	Capacity bbl./day
22	2	600
30	4	1,850
36	4	2,760
48	4	5,500
60	6	8,600

The capacities shown are also based on the liquid properties previously assumed.

Separator costs . . . Figs. 7 and 8 give curves for estimating the initial cost of standard oil-field separators. Such curves are never entirely accurate because the variation of fitting and control cost has a marked effect on total cost, particularly with small-diameter vessels. If it were not for this, all cost curves should converge to a single point at some small diameter because a minimum wall-thickness vessel would suffice for all pressures.

The curves generally give investment costs within 5 per cent of the average published prices for A.P.I.-A.S.M.E. code pressure vessels. Where noncode 125-psig. vertical separators are used, the prices shown should be reduced about 6 per cent.

BOOKS

HEAT TRANSMISSION, Third Edition. By William H. McAdams, professor of chemical engineering, Massachusetts Institute of Technology. Published by McGraw-Hill Book Co., 330 West 42nd St., New York 36. 532 pp., $8.50.

This well-known text and reference book for practicing engineers and students has been thoroughly revised to reflect the progress made in the last few years in the field of heat transfer. Much material in the second edition has been simplified and new information added. The text has been improved by more extensive use of analytical methods and expanded derivations, and by the addition of greater descriptive passages. The book provides an authoritative, up-to-date treatment of all phases of heat transfer with a critical evaluation of the data.

The chapter on radiant-heat transmission has been completely revised by M.I.T.'s Prof. H. C. Hottel. The section on gas radiation includes new charts for evaluating the emissivity due to sulfur dioxide, carbon monoxide, and ammonia; and the carbon dioxide and vapor-pressure charts have been expanded to permit estimation of radiation at rocket-gas temperatures.

New chapters cover natural convection, compact exchangers, packed and fluidized systems, high-velocity flow, and rarefied gases.

THE PRACTICAL ENGINEER—Pocket Book. Edited by N. P. W. Moore. Published by Pitman Publishing Corp., New York. 744 pp., $3.

The sixty-fifth edition of this handy pocket-size, engineers' reference handbook has been further revised and an entirely new section on industrial hygiene has been added.

The text gives concise information on all major fields of mechanical engineering, and includes technical dictionaries in German, French, and Spanish.

Some of the fields covered are piping, metallurgy, steam and steam engines, gas and oil engines, gas turbines, compressors, hydraulics, and lubrication. The section on bearings and mechanical transmission has been largely rewritten. The section on locomotives has been revised and extended. And a short selected list of trade and research associations has been added for reference.

The book's index, placed in the front, provides a fast means of locating information on a given subject. Tables, drawings, photographic illustrations, and formulas give detailed information on the many subjects covered.

WATER-TREATING and injection facilities of the Salem flood. Peak water volume will be about 350,000 bbl. per day. Fig. 1.

SALEM FLOOD: Milepost in Conservation

Expected recovery: 200 million barrels from five formations

by Richard W. Love

Editor's note . . .

The mammoth Lake Centralia-Salem oil field probably represents the biggest assortment of monumental problems ever lumped together in one water flood. The project, operated by The Texas Co. for itself and 26 other companies in the Salem Unit, covers 8,300 acres and includes about 2,400 wells.

The big flood is expected to recover roughly 200,000,000 bbl. of secondary oil from simultaneous floods of five separate formations. Primary recovery to date has been about 222,000,000 bbl., but only about 15,000,000 more could have been produced by primary means. Some 1,680,000,000 bbl. of water will be injected into 600 wells, with about 350,000 bbl. per day expected to be the maximum. The over-all expenditure will probably come to $60,000,000 or $70,000,000.

To get the flood started, the unit engineers had to figure out what kind of flood to use for the five separate zones and how to select the injection wells. The problem was to get a uniform flood front and still keep an effective producing-well pattern for each zone. They had to find a good water supply and a way to treat it cheaply. They had to distribute the great volume of injection water around the field. They had to consolidate the field's cumbersome crude-oil gathering system since there were more than 360 individual tank batteries in the field, many needing a lot of repair.

LAKE Centralia-Salem field is one of the largest units ever formed for water flooding. Over the expected 20-year life of the flood, about 1,680,000,000 bbl. of water will be injected. Now, about 137,000 bbl. is injected daily into a modified peripheral-type flood of five separate zones.

Author is unit superintendent of the Salem unit, The Texas Co., unit operator. Paper presented before Interstate Oil Compact Commission, Chicago.

The producing horizons in the field as shown by Fig. 2 are these: The sands which include the Benoist, Renault, and Aux Vases; the upper limes which include the McClosky, Salem, and St. Louis; and the lower limes which are the Devonian and Trenton. All these zones are being flooded simultaneously except the Salem, St. Louis, and Trenton which are not suited to water flooding.

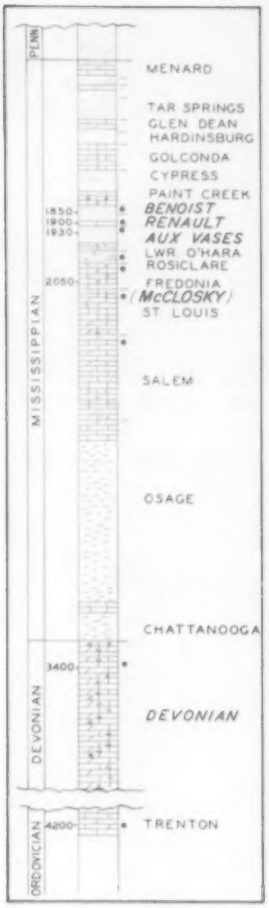
The field itself is an asymmetrical anticline 6½ miles long and 2½ wide. It covers about 9,500 acres of Marion County, Illinois. The discovery well, The Texas Co. 1 E. Tate, proved oil in the Benoist, Renault, Aux Vases and McClosky. Later drilling proved the underlying St. Louis-Salem, Devonian, and Trenton production.

With no conservation or spacing rules, the field's development was a boom. Within the first 2 years, the field produced half of all the oil it produced up until 1950. By that time, production had fallen to an average of 4½ bbl. per day from the 2,400 wells drilled.

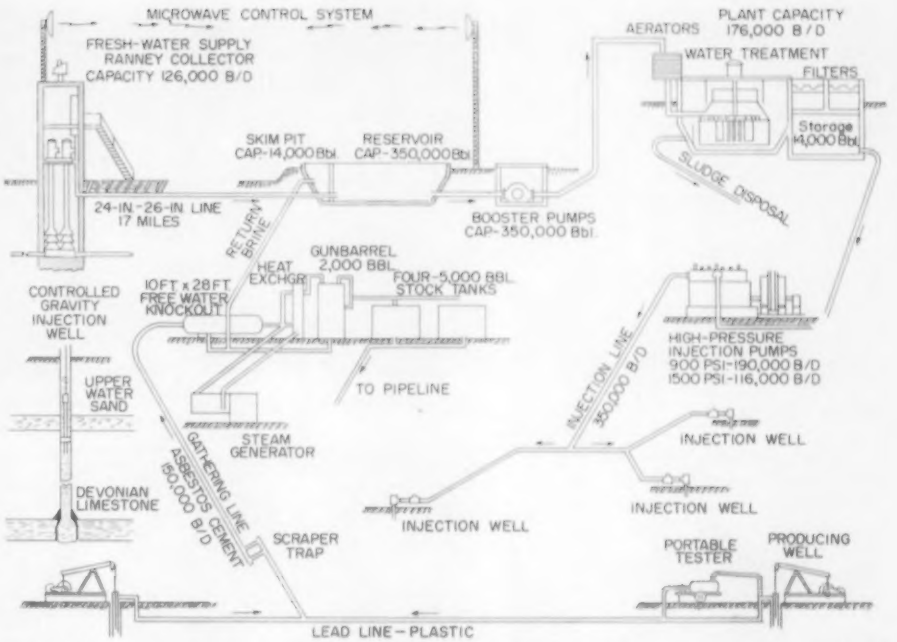
How it was unitized . . . When the idea to unitize was first considered, 27 different companies had operating interests. The Texas Co. held about 70 per cent, with Magnolia Petroleum Co., Ohio Oil Co., Kingwood Oil Co., Shell Oil Co., and Rock Hill Oil Co. holding another 20 per cent. Twenty-two other interests held the remaining 10 per cent.

All operating interests have now signed the agreement with the exception of one which holds a small lease about 16 rods square.

The royalty interests numbered about 2,000 and they were located in 44



PRODUCING FORMATIONS of Lake Centralia-Salem field. The Salem, St. Louis, and Trenton limes are the only pays not being flooded. Fig. 2.



FLOW PLAN of the Salem unit. Total water injected over the 20-year life of the flood will be 1,680,000,000 bbl. Fig. 3.

states and 7 foreign countries. At present, all but 100 have signed the unitization agreement.

The operators held their first meeting for unitization in July 1948. This was only 26 months before the unit first went into operation. The operators agreed at this meeting that unitized operation would permit a very big increase in ultimate recovery. Besides getting the best in conservation of the oil and gas, unitization would also give every operator a share of greater production than would be possible otherwise.

Participation . . . There are two sets of equity used, one for the primary reserves, and one for the secondary. In figuring the primary reserves, the decline rate at the time of unitization was taken, and 0.7 bbl. of oil per day per well was used as the economic limit. Each tract shares in the primary reserves in the same ratio that its daily production at unitization had to total field production from the same formation then.

The acre-feet of pay is the controlling factor in figuring secondary reserves of the sand formations. For the lime formations, the surface productive acreage is used as the most practical basis for figuring participation factors. This expressed mathematically is:

Participation in primary reserves:

$$F_{tp} = P_t / P_f \times 100$$

Where:

F_{tp} = Tract primary participation factor.

P_t = Average daily production from tract during period from July 1, 1947, to July 1, 1948.

P_f = Average daily production from field during period from July 1, 1947, to July 1, 1948.

Participation in secondary reserves:

$$F_{ts} = \left[\left(\frac{AFS_t}{AFS_f}\right)\left(\frac{SR_s}{SR_f}\right) + \left(\frac{SAM_t}{SAM_f}\right)\left(\frac{SR_m}{SR_f}\right) + \left(\frac{SAD_t}{SAD_f}\right)\left(\frac{SR_d}{SR_f}\right)\right] \times 100$$

Where:

F_{ts} = Tract secondary participation factor.

AFS_t = Acre-feet sand production for tract.

AFS_f = Acre-feet sand production for field.

SAM_t = Surface acres production from McClosky for tract.

SAM_f = Surface acres production from McClosky for field.

SAD_t = Surface acres production from Devonian for tract.

SAD_f = Surface acres production from Devonian for field.

$\frac{SR_s}{SR_f}$ = Ratio of secondary reserves in sands to total secondary reserves in field.

$\frac{SR_m}{SR_f}$ = Ratio of secondary reserves in McClosky to total secondary reserves in field.

$\frac{SR_d}{SR_f}$ = Ratio of secondary reserves in Devonian to total secondary reserves in field.

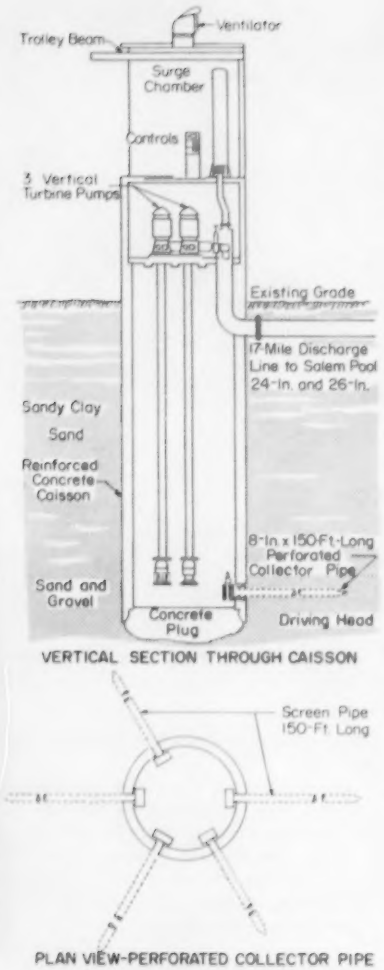
The net feet of pay was found by this general method[1]:

$$= \frac{\text{Sand thickness}}{\text{Area under the S. P. log}}$$

$$\text{Total e.m.f.}$$

The water table in the three productive sand zones was 1,355 ft_r subsea,

WATER COLLECTOR, one of the two operating at Salem, each with a capacity of 126,000 bbl. per day. Fig. 4.



WATER COLLECTOR PLAN. The three vertical turbine pumps are controlled by microwave from the treating plant 17 miles away. Fig. 5.

and this depth was used as the base of the pay unless proven otherwise.

The operators made these rules to fix the boundary of the reservoir:

1. In a given reservoir, an edge well at a proven productive location was to be credited with 10 productive acres. The acreage is in the form of a square with the well at the center. To be credited, the well had to be in good enough mechanical condition for use in injection or production. If it were not, no acreage was given.

2. Any rectangular corridors less than 661 ft. wide that are formed by productive acreage are also considered productive. In certain areas with 20-acre spacing, the distance was raised to 1,321 ft.

3. There are some rectangular tracts of 10 acres or less that are offset diagonally on the corners by 10 accredited acres. These tracts were given half credit by drawing a diagonal line between the two corners which are offset.

In applying these rules to the sand reservoirs, however, the operators used the contour line of zero pay thickness as the boundary.

Size of the reservoirs . . . Isopachous maps for the three sands gave this result:

	Acre-feet	Per cent
Benoist	230,838	58.8
Renault	35,544	9.0
Aux Vases	126,307	32.2
Total	392,687	100.0

The weighted average porosity, residual oil, and interstitial water gave this result:

POROSITY

Benoist	17.9 × .588 =	10.5
Renault	16.5 × .090 =	1.5
Aux Vases	16.3 × .322 =	5.2
Weighted average		17.2

Residual oil:

Benoist	18.9 × 0.588 =	11.1
Renault	17.0 × 0.090 =	1.5
Aux Vases	19.0 × 0.322 =	6.1
Weighted average		18.7

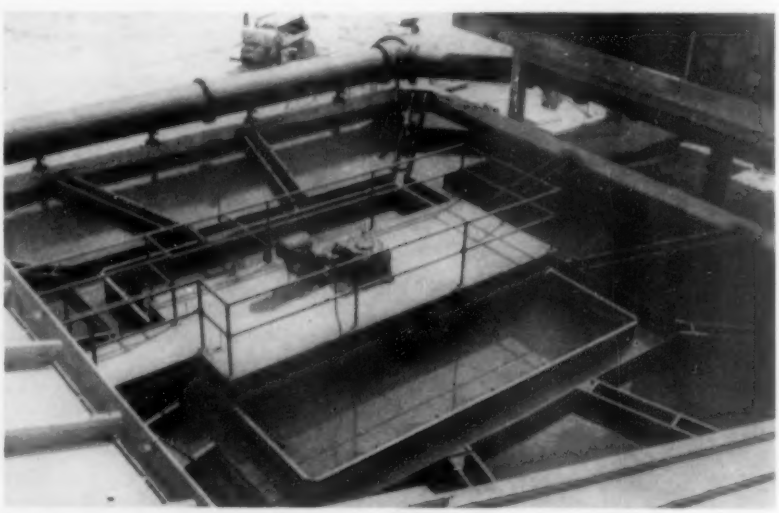
Interstitial water:

Benoist	24.6 × 0.588 =	14.5
Renault	33.6 × 0.090 =	3.0
Aux Vases	34.1 × 0.322 =	11.0
Weighted average		28.5

Oil viscosities:	Centipoises at 93°
Benoist	3.91
Renault	4.85
Aux Vases	4.35

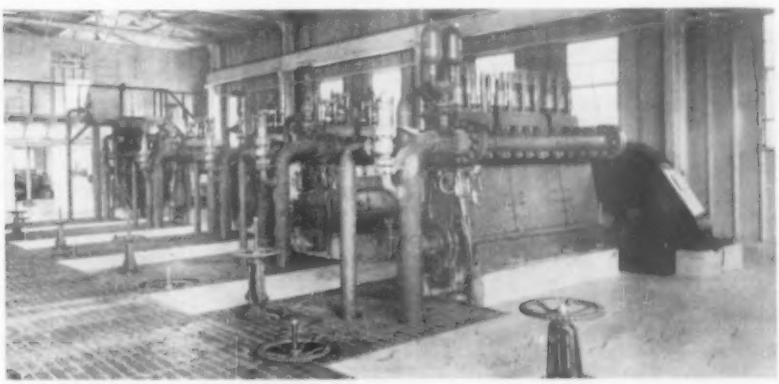
Gas-oil-ratio data and bottom-hole fluid set the formation-volume factor for the sands at 1.1232. The recovery factor was estimated at 80 per cent based on a 98 per cent water cut.

All the above data showed:



REACTION CHAMBER, one of two, each with a capacity of 88,000 bbl. daily. Fig. 6.

TREATING BUILDING. Design was a problem since the water at first was 100 per cent fresh, but later on will be 100 per cent produced brine. Fig. 7.



INJECTION STATION. Present capacity is 190,000 bbl. per day at 900 psi. To meet peak loads, a total of 22 pumps will be installed. Fig. 8.

	Bbl. per ac.-ft.
Original stock-tank oil in place	950.4
Residual oil in place	249.3
Primary recovery	331.2
Recoverable secondary oil	296.0

All three reservoirs were considered together because of their past production history and location in geologic table.

A comparison with similar formations in other areas led to use of a recovery factor of 80 per cent for the McClosky lime compared to primary production. For the Devonian, 100 per cent was used. The McClosky has three main oolitic limestone pays and several other small pay sections. They cover about 8,650 acres with an average pay thickness of about 20.2 ft. Some 200 ft. of closure is productive. The permeabilities are as high as 3,000 md. and as low as 5 md. The average is 434 md.

The Devonian reservoir covers about 6,284 acres and there are three pay zones. The most important of these is Zone II. It is from 17 to 23 ft. thick and lies from 62 to 82 ft. from the top of the Devonian lime proper. The lime has an average permeability of 71 md., the range being from 2 to 713.

Average porosity is 17.7 per cent, ranging from 9.7 to 28.7. Oil and water saturations average about 27.0 and 21.7 respectively. Largely, the porosity is in vugs which range from microscopic to finger size.

Probably the values shown here for porosity and permeability are low, since the better part of the pay is usually not recovered in cores. The initial high production and the high decline rate also point to an average permeability over 71 md.

Flood plan . . . Due to the stratigraphic interrelation of these formations the flood program was laid out in four separate units:

1. Benoist sand.
2. Combined Renault and Aux Vases sands.
3. McClosky limestone.
4. Devonian limestone.

The final selection was a modified perimeter-type flood. In other words, development can be converted to the pattern type at any time.

The flooding program actually is four separate projects which operate independently of one another with the exception of a common water-supply system. The inside injection wells direct the advancing water-flood front continuously upstructure and generally speed up the flooding rate.

The flood at Renault and Aux Vases formations is together because their areal extent, shape, and location are similar. Moreover, in parts of the field Renault and Aux Vases are separated by only a thin shale break; and flooding them together provides a continuous passage across the field.

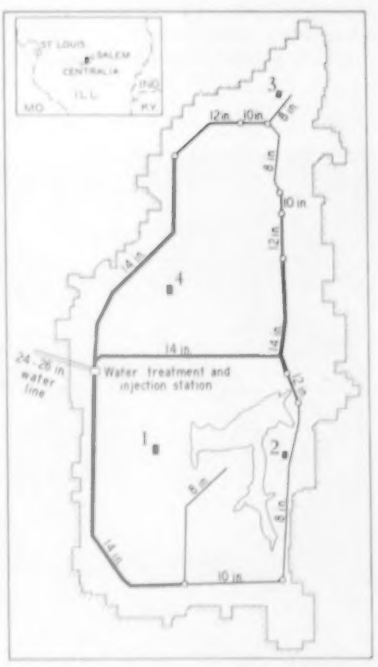
Fig. 3 is a flow plan of the unit.

Water Supply

Some 1,680,000,000 bbl. of water will be injected during the 20-year life of the flood. About 350,000 bl. per day will be injected at peak conditions. Of this, 185,000 bbl. per day will be makeup water.

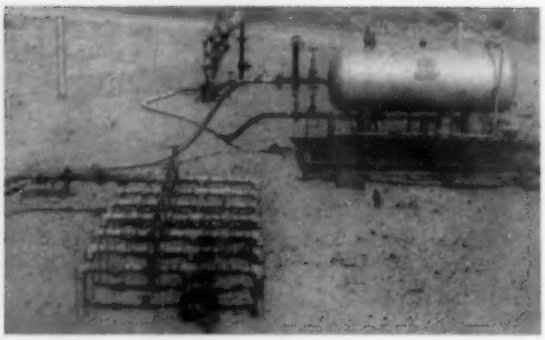
There was no economical supply of this size near the Salem unit. But, a gravel terrace along the Kaskaskia River about 17 miles northwest of the field looked good. Studies of the area showed that 16 conventional wells over a wide area along the river would produce the 185,000 bbl. per day. However, the area has excellent locations for two Ranney-type collectors, each to produce 126,000 bbl. per day.

The Ranney collector saved 23 per cent over the cost of conventional wells. Also, the Ranney collector cost some 60 per cent less than a salt-water source in the field. The collector as built for this system is a concrete caisson 13 ft. in diameter and with 18-in. reinforced



INJECTION SYSTEM at the Salem flood. Block valves at 1-mile intervals and at junction points make it possible to work on a segment without interrupting service on the rest of the system. Fig. 9.

METER BANK for the injection water. A bypass makes it possible to test any one of the meters against a test meter. Fig. 10.



LEASE PRODUCTION HEADER and testing equipment. Before unitization there were 27 operating and 2,000 royalty interests in the field. Fig. 12.

walls. It is sunk through the water-bearing gravel to a depth of 68 ft. A heavy plug of reinforced concrete seals the caisson at the bottom. See Figs. 4 and 5.

To serve as the collector system, perforated-screen pipes of 8-in. diameter were projected 150 ft. horizontally into the aquifer. These pipes were projected by means of water flushing and hydraulic jacks. Continuous flushing through the pipes during installation created a gravel pack by washing away the fine material.

Advantages . . . This type of collector has three advantages over the conventional vertical well:

1. In the collector you have 750 ft. of exposed aquifer compared to 40 ft. for a single vertical well.

2. The entrant head loss between the aquifer and the collector is low because the velocity of the water is low. This loss is a matter of inches as compared to feet of loss into conventional wells.

3. The low head loss eliminates many of the causes of mechanical failure in conventional wells. These troubles result from sanding or from encrustation of salt, iron oxide, and other materials.

The collector has three vertical turbine pumps sized to deliver 68,500, 102,500, and 137,000 bbl. per day respectively. A microwave system in the water-treatment-plant building controls these pumps. A tapered 24 and 26-in. welded-steel line carries the water from the pumps to Salem field. The line is coated, wrapped, and cathodically protected.

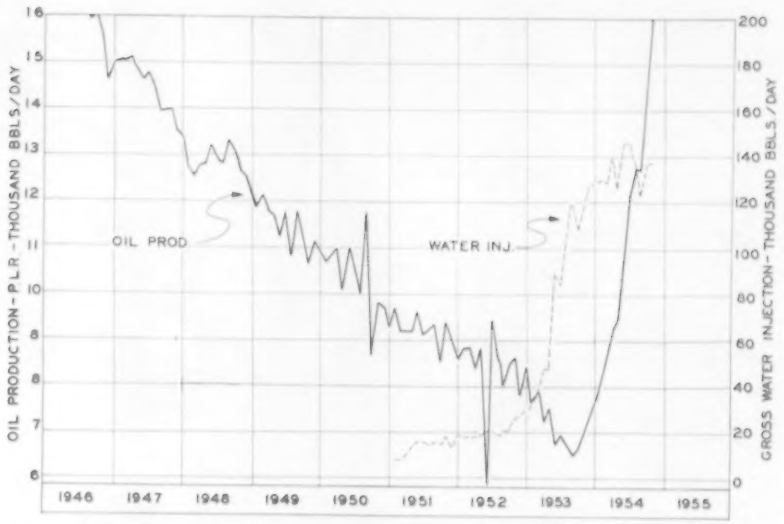
Water Treatment

The concrete basin, shown in Fig. 1, is 509 by 351 by 12 ft. deep and stores produced water. The basin also mixes this brine with the fresh-water makeup. All produced brine comes into a 168 by 40-ft. section in the northwest corner of the basin; any oil present is skimmed off in this section before the brine mixes with the fresh water.

A concrete division wall in the basin permits use of either side of the basin independently of the other. Also, water may be pumped directly into the treatment plant, bypassing the basin completely.

Four 75-hp. centrifugal electrically powered pumps with a capacity of 87,500 bbl. per day each move the water from the basin to the aerators. There are two forced-draft-type aerators with a capacity of 88,000 bbl. per day each; they are located next to the treatment building. From this point the water

CONSOLIDATED TANK BATTERY, one of two that serve the Salem flood. Originally there were 365 individual batteries. Fig. 11.



PRODUCTION HISTORY of the Salem unit. The wells were producing an average of only 4½ bbl. per day each when the field was unitized. Fig. 13.

flows by gravity to the injection pumps.

For chemical treatment, there are two 48 by 48 by 16-ft. deep rapid reaction chambers. Fig. 6 is one of these. Each of these has a capacity of 88,000 bbl. per day of a brine containing 100,000 p.p.m. chloride. These vessels are of the accelerator type and constructed of concrete.

The plant has four 29 by 24 by 9-ft. gravity sand-and-gravel filters. Each contains 27 in. of filter media.

The bottom floor of the treatment building holds a 68 by 120 by 10-ft. clear well. It provides a storage or suction chamber of 14,000 bbl. of treated water for the injection pumps.

Designing the treatment plant was a big problem. The plant, first, has to treat almost 100 per cent fresh water. But, as the flood progresses, the same facilities will be called on to handle 100 per cent produced fluids. The present plant can handle 176,000 bbl. per day, but capacity can be doubled without interrupting operation. Fig. 7 is a view inside the treating building.

Injection Station

The injection station has three 600-hp. septuplex pumps, two 500-hp. quintuplex pumps, two 300-hp. triplex pumps, and two 125-hp. quintuplex pumps. There are also two 125-hp. variable-stroke triplex pumps. The combined capacity is 190,000 bbl. per day at 900 psi.

The plant is designed so that it may reach a capacity of 350,000 bbl. per day by placing additional pumps. To meet this demand a total of 22 pumps will be required with 11,150 connected horsepower. Fig. 8 shows the present facilities.

The combination of the septuplex, quintuplex, and triplex pumps is a means of delivering a wide range of injection-water volumes as the flood develops and bigger volumes are needed. The variable-rate pumps are in the system to maintain a constant selected line pressure or volume.

All pumps are driven by slow-speed (277 r.p.m.) direct-connected synchronous motors with the exception of the variable-rate pumps. These have induction motors.

High-Pressure Distribution System

The injection system has 18 miles of line grading in size from 8 to 14 in. The line follows a peripheral pattern around the field as shown in Fig. 9. Three sections leave the plant and one line extends across the center of the field to give flexibility to the system. In addition, there are block gate valves at 1-mile intervals and at all main junction points. These give a means of isolating any one segment of the line without disrupting service to the rest of the system.

Some 53 miles of lateral lines connect the main trunk system to the individual injection wells.

One-inch bronze meters of the wobble-plate type meter the injection water. Central metering stations are located around the field and each station has a bank of two to nine meters serving the same number of injection wells. Each bank has a bypass system so any meter may be tested against a test meter. Fig. 10 is one such bank.

Oil-Gathering and Treating System

The oil-gathering system is designed for a maximum wellhead pressure of 50 psi.; and the flow lines are sized accordingly. To prevent corrosion problems, all flow lines are either plastic or cement asbestos. For economic reasons, plastic pipe is used for all 2 through 5-in. lines, while cement asbestos pipe is used for all lines 6-in. through 14-in.

There are scraper traps at all junction points of the cement-asbestos line. A bypass at each scraper trap permits continuous operation of the system while a pipeline pig is placed or removed. The plastic lines have no scraper traps since the experience has been that paraffin does not stick to the plastic pipe.

Two large tank batteries like the one in Fig. 11 now serve the field in place of the 365 individual batteries in use when the unit was formed. Each battery has two 10 by 28-ft. horizontal free-water knockouts, and 2,000,000-B.t.u. and one 4,000,000-B.t.u. horizontal steam generators. There are also three 2,000-bbl. gun barrels with vertical steam-to-oil heat exchangers and six 5,000-bbl. cone-bottom storage tanks.

References

1. Doll, H. G., "The S.P. Log," A.I.M.E. New York meeting, February 16, 1948.

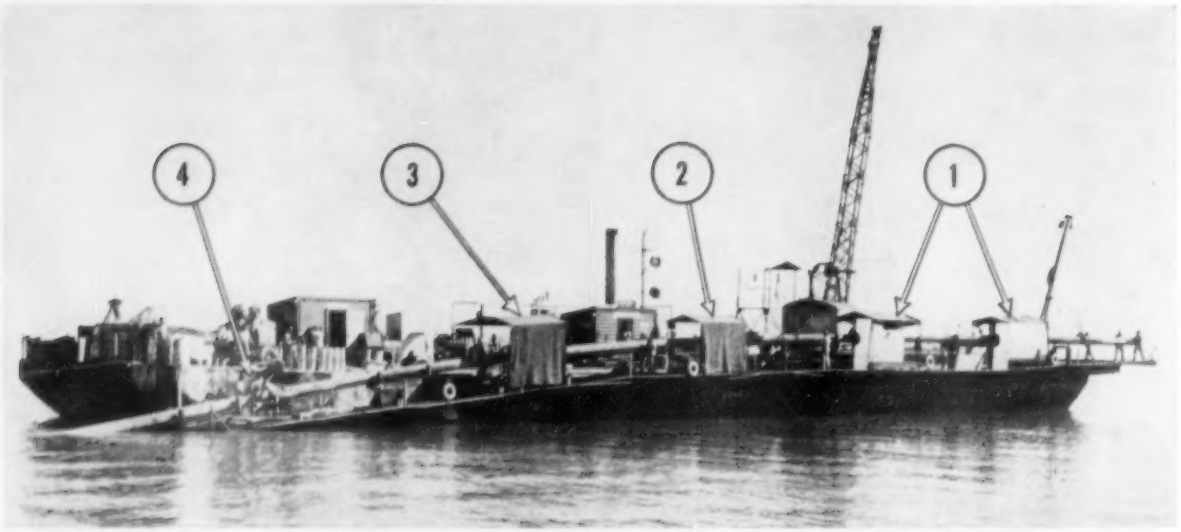
NELSON REFINERY CONSTRUCTION INDEX

Compiled by W. L. Nelson, Petroleum Refinery Consultant, Tulsa.

The Index was explained July 7, 1952 (page 105) as well as the Indexes of Individual Items of Equipment that appear on the Cost-imating page in the first issues of the months of January, April, July, and October.

	Index (1946 = 100)					
	1948	1950	1952	1953	1954	Nov. 1954
Pumps, compressors, etc.	127.0	138.2	155.6	162.5	166.5	166.6
Electrical machinery	127.6	134.9	154.2	156.4	160.0	160.5
Internal-combustion engines	116.9	126.0	146.5	148.1	150.5	150.1
Instruments	120.0	127.8	146.2	151.8	154.6	158.1
Heat exchangers	130.0	140.0	165.8	174.9	171.7	166.4
Miscellaneous equipment average	*122.1	*126.2	153.3	158.8	160.7	160.3
Materials component	139.3	149.5	164.3	172.4	174.6	176.0
Labor component	128.0	144.0	163.1	174.2	183.3	186.3
Nelson construction index	132.5	146.2	163.6	173.5	179.8	182.2

*Used in computing the Nelson Index until April 1952. These are slightly different than the average of the Miscellaneous Equipment Items shown above.



LAY BARGE used on deep-water portion of line. Work positions are (1) welding stations, (2) X-ray station, (3) coat-and-wrap station, and (4) joint-concreting station.

Here are the details behind planning and laying of

WORLD'S LONGEST OFFSHORE PIPELINE

by Clyde Aldridge and Carl Helm

THE world's longest marine pipeline is scheduled to be completed this spring by Magnolia Petroeum Co. When finished, the 12-in. crude line will run 48 miles into the Gulf of Mexico from the coast of Louisiana to pickup production in the Eugene Island area.

Construction started last summer and about 32 miles was laid before bad weather halted the work. Laying of the concrete-weighted pipe was by conventional lay barge with ditch being provided by clam and jet dredge to give a minimum 3-ft. cover.

Need for Line Evolves

Planning the line started in 1954 but oil operations in the area go back another 10 years. In 1944, Magnolia started exploration work off the coast of Louisiana in the Gulf of Mexico. Drilling operations in the gulf started in August 1946 in the Eugene Island area. First production for Magnolia in this area was Magnolia-Continental-Newmont A-1, Block 126, Eugene Island area. A tank-battery platform was built and oil was barged ashore.

As production increased, it became more difficult to barge the oil ashore due to low capacity of the barges and bad weather conditions. To increase the delivery, small tankers were put into service. Movement of produced oil on schedule was still not always possible and study was given to the building of a pipeline. After long study into the economic feasibility of a marine pipeline, Magnolia started planning the gathering line in early 1954.

Early plans . . . Before construction could begin, several questions had to be answered: (1) What type of sediment would the line traverse? (2) How many and what type of reefs would be encountered? (3) What specific gravity should the line be weighted to? (4) Would the line have to be buried only out to the 15-ft. contour, as required by U. S. Government regulations, or should it be buried for the total distance?

These and many other problems entered into the design and plans of the project.

All known reports of geological and physical investigations were studied and various underwater projects were visited.

The line of 12¾-in. o.d. pipe was planned to start at Burns, La., plant site near East Cote Blanche Bay. It was to extend to Block 126 field, Eugene Island area, via Block 45 field, running a total distance of about 48 miles.

This gathering line, with an ultimate crude capacity of 60,000 bbl. a day, is to be operated by Magnolia Petroleum Co. for Magnolia, Continental Oil Co. and Newmont Oil Co. Oil and gas separation will be made at Burns plant site. At the line's terminus in Block 120, several connecting platforms were provided for various phases of the operation, including living quarters for personnel.

Route Surveys

On July 20, 1954, Magnolia started the initial ground survey for the laying of the longest marine pipeline. Aerial photographs were obtained showing the coastal areas. From these the best possible right-of-way into the bay was selected. Prior to the water survey, a field crew staked out the line from Burns plant site to the shore line.

A U. S. Government hydrographic chart was enlarged to a scale of 1 in. to 4,000 ft. and all known points and structures in the immediate area were plotted on the map. Also, the block lines in the gulf were drawn on the enlarged chart. The straightest possible route to Block 45 field was laid out to clear all obstructions and channels.

ROUTE OF THE LINE which will carry production from prolific offshore blocks.

SKIN DIVER, standing near ladder, checked bottom conditions on the route. Tear-drop-shaped device is sounder for acoustic probe.

Engineers decided that all the survey work would be plotted on the Lambert conformal conic projection, Louisiana, South Zone. Lambert coordinates were calculated for points along the line at 2-mile intervals and bearings to known points were noted.

The area to be crossed by the pipeline was, first, East Cote Blanche Bay for 11 miles and then, open waters of the Gulf of Mexico for 36 miles. Water depth in the bay ranged from 0 to 8 ft. and in the gulf from 8 to 36 ft.

In East Cote Blanche Bay many shell reefs are present. A small lateral movement of the route can greatly change the number of reefs crossed. To insure the laying of the pipeline along the route picked, pile markers were driven at 2-mile intervals until the Point Au Fer reef was crossed. These markers were maintained until laying was completed. Buoys marked the rest of the line to Block 45 and Block 126.

Many cores taken . . . Soil cores were taken with a Hanna core barrel along the line. Between the core locations, a low-frequency acoustical probe was used to establish continuity of the sediment.

Length of cores varied from 9 ft. to 1 ft., depending upon the character of the bottom. When very stiff clays with a low water content (25-35 per cent) were encountered at shallow depths, a very short core was obtained. Where a sediment of moderate water content (40-50 per cent) was encountered, a 9-ft. core was obtained.

Length of the cores from the outer reef to Block 45 field depended upon the depth of the water. The core barrel used for this portion of the line was 22 ft. long and as the water depth increased, the core length decreased. When the water depth was too great for this core barrel, a weighted free-falling core barrel was used. When a reef was encountered, it was probed to a 12-ft. depth to determine its character. Only three reefs were encountered along the proposed line and Point Au Fer was the only cemented shell reef.

Geological plot . . . From the coring and probing data, a geological cross-section was plotted and the character of the soil along the ditch line carefully checked. The sediments along the proposed line from the shore to Block 45 were divided into five general groups: (1) mud, (2) mud and shell, (3) shell, (4) slightly stiff clay, (5) moderately stiff clay.

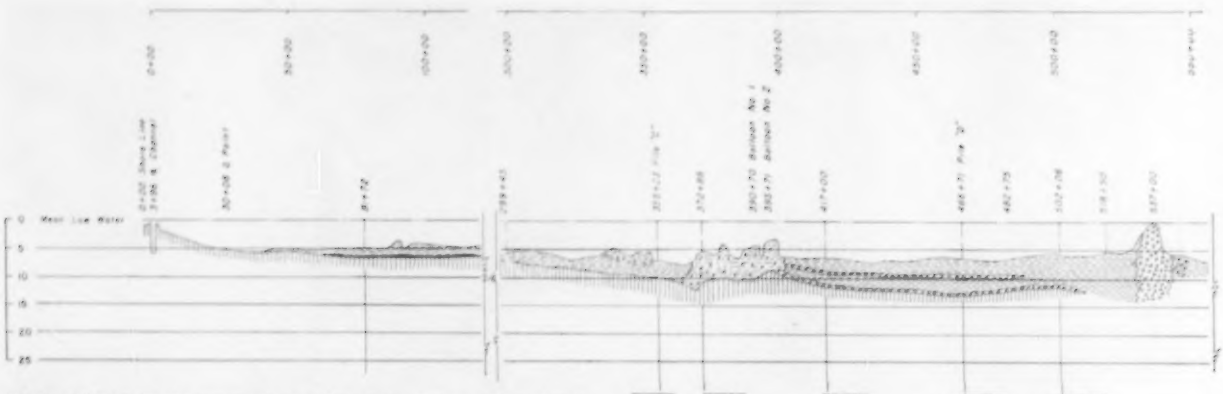
From Block 45 to Block 126, cores were taken at regular intervals to a depth of 5 ft. from the water-sediment interface with a Hanna core barrel. From 5 ft. to 35 ft. readings were taken with a low-frequency fathometer (Magnolia substrata acoustic probe). Sediments along this traverse were divided into five groups: (1) mud, (2) sandy mud, (3) muddy sand, (4) clean sand and shells, (5) slightly stiff clay.

All the sediments along this portion of the line to a depth of 4 ft. would support the weight of the pipeline. Profile of the bottom was drawn from soundings made by a portable recording fathometer and geological data noted on it. At the completion of the coring and probing, the ground survey work was ended.

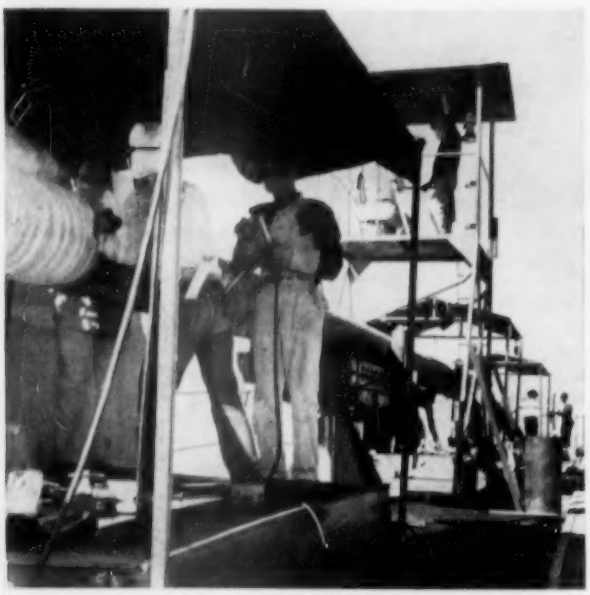
Line cover . . . U. S. Government regulations require that all pipelines laid from shore shall be buried until a depth of 15 ft. below mean low gulf level is reached. The coring and probing analysis showed that the immediate gulf and bay floor was not overlaid with a deep, soft silt deposit along the proposed route. This meant that the pipe would be supported without a great deal of bridging.

A sample of rock was taken from the outcrop at Block 126 showing the action of clams (Lithophaga Bisulcata) on siltstone and limestone. These particular clams will not attack below the sediment level. This line was designed to have a minimum 3-ft. cover to eliminate the possibility of the clams boring into the concrete coating on the pipe. Also, this cover protects the loaded line from dynamiting by exploration crews working in the area.

Pipe purchased for the job was X-42, 12¾-in. o.d., double random length, electrically welded. It was hydrostatically tested at pressure of 2,100 psi.

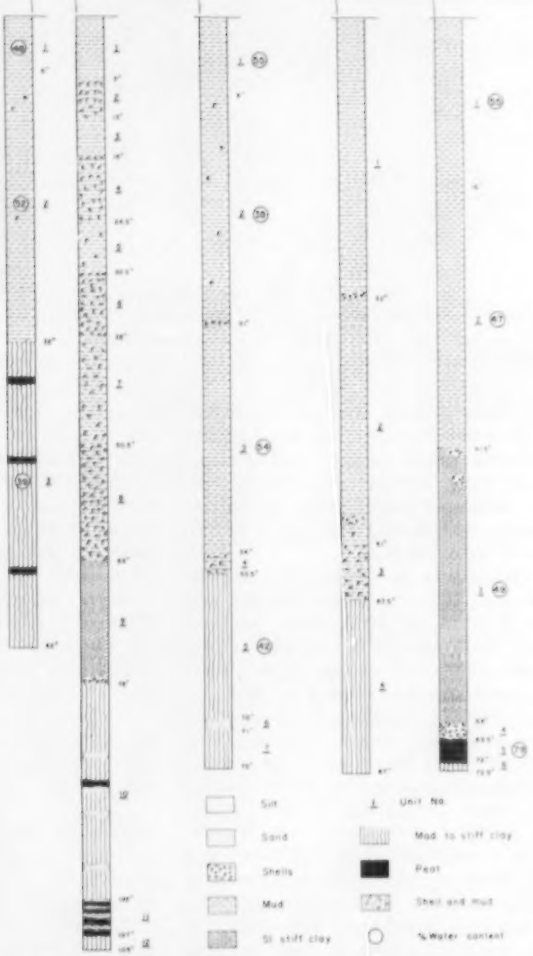


GEOLOGICAL PLOT was made of entire route. Center section shown here is across Point Au Fer Reef.



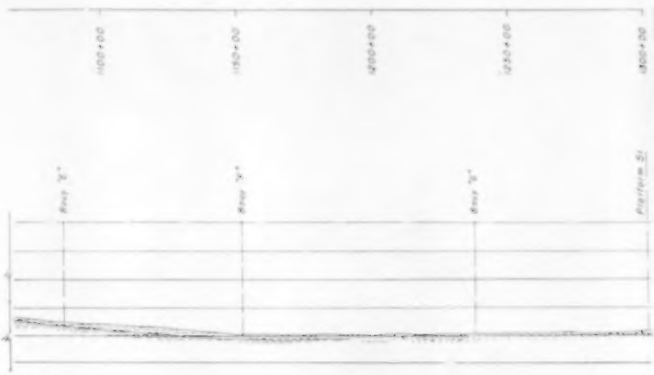
LOOKING AFT along lay-barge work line. Just behind welding station is control tower from which laying was supervised.

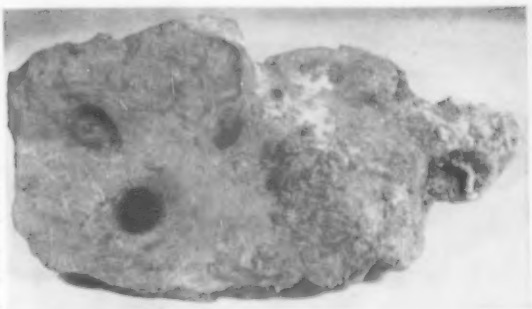
WELDS WERE X-RAYED and the films developed and analyzed before joint went in.



BOTTOM CORINGS like these helped determine soil characteristics along the ditch line.

"Pipelining in the Gulf of Mexico is solely dependent on the weather. Good weather prevails through the fall but little can be done during winter months because of low tides and strong winds."





ROCK-BORING CLAMS (lithophage Bisulcata) are active in the area. This sample came from Block 126.

with three joints tested to ultimate strength of 3,350 psi.

Coating and weighting . . . At Harvey, La., the pipe was coated and weighted. First cleaned by a grit-blast machine, the pipe was then primed and coated with coal-tar enamel plus a glass wrapper and pipeline felt covering.

Concrete with a reinforcing wire mesh was then applied uniformly to the pipe. When completed, the thickness of the concrete was 1½ in. and the total weight of the pipe was 118 lb. per foot. Each joint was weighed as the concreting was completed.

The concrete-coated pipe was then cured in the yard and stockpiled. Part of the coating was cured by water spraying. The pipe was placed on a curing bed of sand and water sprayed for 7 days before handling. The remainder of the pipe was cured by the Hunt process which consisted of spraying a plastic coating on the concrete and placing the joint on a sand bed for 3 days before stockpiling. The pipe was barged to the construction site as needed.

Construction Starts

On September 24, 1954, Magnolia started construction of the pipeline with Brown & Root, Inc., the prime contractor.

Between the pipe markers in the bay area, 2 by 2-in. stakes were placed at 200-ft. intervals, offsetting the ditch line by 20 ft. On the remainder of the line, buoys were set at 2,000-ft. intervals on the center line of the ditch. Alignment was maintained from the stakes and buoys.

The geological study revealed that 2½-yd. draglines on spud barges would cut the ditch through the bay area, prior to laying the line. The sediment beyond Point Au Fer reef could be handled by a jet-suction dredge and here the pipeline was first laid and then ditched.

Ditching was started September 24, 1954. Two 2½-cu. yd. draglines, mounted on 30 by 90-ft. spud barges, were used in the bay area. In this area 36,000 ft. of the line had to be 11 ft. below mean low gulf level. This was to prevent damage to the line if channels were cut into locations in this area in the future.

The remainder was dug to provide 3 ft. of cover. To leave a clean ditch for the pipe, the ditch was made 20 ft. wide at the top and 10 ft. wide at the bottom. The ditch held well and only 1 day's work with a jet dredge was necessary to lower the few high spots left on this portion of the line. Floatation ditches (6 by 50 ft.) were necessary where water depth was less than 6 ft.; 64,500 ft. of ditch, including floatation, was dug by these two machines at an average rate of 2,300 ft. per day.

Two lay barges used . . . The line from shore to Block 45 field was laid with two spreads. A shallow-water laying barge started just outside Point Au Fer reef and laid toward shore. A deep-water barge started at that point laying towards Block 45 field. Both barges had five working positions, i.e.: two welding positions, one X-ray and primer position, one doping-and-wrapping position, and one joint-concreting position. Thirteen miles of line were laid with the shallow-water barge and 12 miles of line were laid with the deep-water barge.

The shallow-water barge was propelled forward by pulling against the pipe while it was held on line by tugs. When it had moved forward to the next station, the spuds were dropped and another joint welded on. Work was continuous until the pipe was welded, X-rayed, primed, doped, and wrapped, and the joints concreted and lowered into the water. The work stations were elevated to such height as would provide a smooth curve for the pipe while it was on the barge and would hold it in such position as to prevent undue strain on the pipe when it was lowered overboard.

As the line was laid, a continuous measurement was made on the pipe and a float with the distance painted upon it was attached to the pipeline at 1,000-ft. intervals. A diver inspected the line in the ditch and soundings to the top of the pipe were taken as it was inspected. From this information, a continuous profile was kept of the completed line and any high points marked for additional lowering.

Only one bend . . . The line was laid straight except for one angle which was necessary near the shore line. Since a fabricated bend was not desired at this point, the pipe was pulled around this curve with a maximum deflection of 1 ft. per 40 ft. No difficulty was encountered in this and no excessive cracking of the concrete coating was noticed.

When the barge reached the shore line, 1,300 ft. of pipe was shoved from the barge. This carried the pipe out of the marsh. The remainder of that portion was completed by conventional methods. Top production on the shallow-water barge was 103 40-ft. joints in a 10-hour day, with an average of 71 joints per day.

The deep-water barge was held on line and propelled forward by steam-powered draw works attached to eight

THE AUTHORS

C. ALDRIDGE

C. H. HELM

Clyde Aldridge, senior civil engineer in the civil-engineering department, has been with Magnolia since 1950. He has a B.S. degree in civil engineering from University of Oklahoma.

C. H. Helm has been with Magnolia since 1941 and is presently section chief, civil-engineering department. He graduated from Kansas State College in 1940 with a B.S. in civil engineering.

COATING-AND-WRAPPING STATION where field joints were doped and electrically inspected.

POURING CONCRETE FIELD JOINT, last act before lowering in. Steel forms are banded to pipe to hold concrete.

anchors. The anchors were placed in the following manner: two ahead, four abreast, two astern. The anchors were moved forward by a tug as the pipe laying progressed. Top production of the barge was 100 joints in a 10-hour day, with an average of 65 joints per day. After the pipe was ditched by a jet-suction dredge, a diver inspected the pipe in the ditch for damage to the coating and took soundings to determine whether the pipe was at the required depth. From this information, a continuous profile of the line was plotted.

Backfilling was done only when the spoil on the ocean floor was over 1 ft. high. This was necessary to comply with permit from the Corps of Engineers. Backfilling the line was accomplished with the same machine used to dig the ditch. On the portion of the line lowered by the jet-suction dredge, no spoil was built up and no backfilling attempted. Natural deposit of sediment by the Atchafalaya River in this area is expected to backfill the line in the next few years.

Inspection was accomplished by company personnel, with the exception of the X-ray service and diving service. Welding inspection was both visual and X-ray. Prime, dope, and wrap were inspected visually and by a holiday detector. Concrete joints were inspected visually. Alignment and pipe tally were made by a company engineer. Inspection of the ditch was made by a company engineer and a diver. Concrete coating at the Harvey, La., yard was inspected by a testing laboratory for strength and density. X-ray inspection was made by iridium 192 type exposure and film developed on board the barge. The process was completed and films checked by welding inspectors before pipe was lowered in.

The gates, headers, and other piping for the compressor platform were prefabricated on shore. Risers to come from the ocean floor to the platform were welded onto the last joint of pipe and lowered into position. Final tie-in was then made on the platform proper. The pipe on the platform was carried on spring-loaded rollers.

Weather Is Biggest Problem

Laying pipe lines in the Gulf of Mexico is solely dependent on the weather. The present laying barges can lay pipe until waves reach 4 ft. in height. When higher seas occur movement of the pipe is so great that it is impossible for welders to make a weld.

When the weather caused laying operations to cease, the pipe end was capped, buoyed, and lowered to the ocean floor. The laying barge, pipe barges, and other floating equipment were towed to protective areas until the weather subsided. Weather forecasts were observed and transmitted by radio to laying barges at frequent intervals.

From the middle of September until the latter part of November, good weather generally prevails in the gulf. From December through March, extremely low tides and strong north winds leave the bays and channels too shallow to navigate and cause rough seas. During September and October, there were only 4 days of shutdown time due to bad weather. In November there were 11 days of shutdown time and 13 days were lost due to weather out of the first 16 days in December. This coupled with the long-range weather forecast of continued bad weather during January and February caused the contractor to halt construction in the middle of December.

It was originally planned to finish only that portion of the line from Burns to Block 45 field in 1954. But weather held favorable when Block 45 field was reached and engineers decided to go on as far as possible toward Block 126 field before the bad weather set in. Seven miles of this line was completed before shutdown was necessary. Present plans call for construction of the remainder of the line to commence in April or May of 1955, the date depending on weather.

LOCATED in Colombia's oil-rich Middle Magdelena Valley, Velasquez field can be reached only by air or boat.

ORIGINAL DRILLING in Velasquez was in the Guaguaqui-Teran fee property in 1929. Ermitano and Palagua are being explored now.

Colombia's Velasquez Field Grows Steadily

. . . daily production climbs from 1,079 bbl. in 1950 to 4,179 bbl. in 1954

by H. Tanner and W. O. Martin

Texas Petroleum Co. is gradually building its Velasquez field in Colombia into one of that nation's major producing areas. The field's present potential of 22,000 bbl. daily is mostly shut in for lack of a pipeline outlet and producing facilities. When these are built, the field will be able to produce about 20 per cent of the oil produced in Colombia. Here's a geological report on the field and an analysis of current development and future prospects.

VELASQUEZ field is situated in Colombia's main oil province, the Middle Magdalena Valley. Most of the proven acreage is in the Guaguaquí-Terán fee property, and extends northward into the Palagua and Ermitaño concessions which are presently being explored for oil.

Most of Texas Petroleum's block of concessions and properties in the Middle Magdalena Valley lies in the heavy jungle zone between the Magdalena River and the Eastern Andes, and extends easterly into the foothill zone of this major mountain range. Very dense tropical rain forest covers the entire Velásquez field. The area is peculiar for its numerous steeply flanked small hills which usually rise out of swampy lowlands.

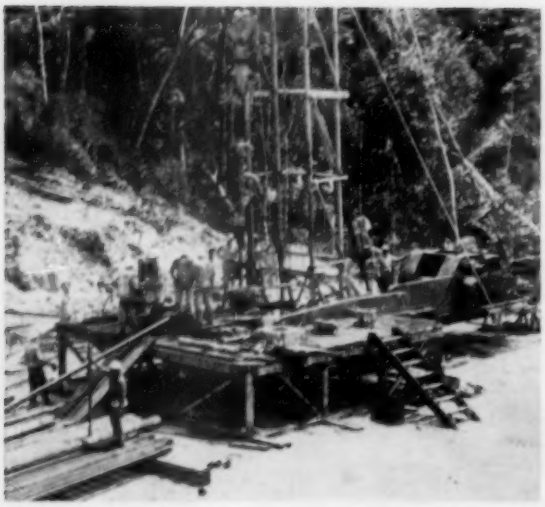
Communications With Exterior

Velásquez field is served only by air and river-boat transportation; there are no rail or road connections with the outside. Magdalena River boats transport heavy cargo upstream from Barranquilla, one of the northern Colombian ports, some 350 airline miles from Puerto Niño; the Magdalena River is the main freight artery from the northern coast to the interior. The river level fluctuates greatly with seasonal rains making scheduled deliveries very uncertain, consequently supplies from the United States must be requisitioned 9 months prior to use.

Puerto Niño, the supply and maintenance base for Velásquez field which is some 10 miles inland, has an air strip 4,600 ft. long. Each week Texas Petroleum's PBY and DC-3's make an average of 10 round-trip cargo and passenger flights between Puerto Niño and Bogotá, and one round-trip flight between Puerto Niño and Barranquilla carrying cargo. Radio-telephone communications connect Velásquez field with Bogotá, and the company's other operations in Colombia. Two-way FM radio connects the drilling rigs, tank batteries and Puerto Niño with the operations office in Velásquez.

The steep hills with soft valleys in between, presenting sharp local relief

H. Tanner is senior geologist, and W. O. Martin is assistant division petroleum engineer, Texas Petroleum Co., Colombian division.



TROPICAL GROWTH around this workover rig in Velasquez field must be pushed back often to keep the drilling site cleared.

ROADBUILDING in this region of Colombia is made difficult and expensive by dense jungle and sharp relief.

up to 100 ft., complicate road building and require that a tortuous system of roads be built generally following the hilltops.

To speed up transportation in the field an excellent system of oiled roads 33 ft. wide has been constructed with a maximum grade of 6 to sometimes 8 per cent and capable of withstanding single pay loads approaching 65 tons. To construct these roads it is necessary to penetrate virgin jungle containing trees up to more than 100 ft. high with diameters in excess of 6 ft.; hills requiring cuts and fills, at times in excess of 30 ft. high, form an additional obstacle.

Drilling-Development of Concessions

The Teran-Guaguaquí property (163,108 hectares, or 403,040 acres) was bought by Texas Petroleum Co. in 1929 in fee as a result of geological reconnaissance work at the mountain front of the Eastern Andes in 1928. This had revealed the presence of Cretaceous shales as possible source rocks, and a thick series of locally oil and tar-saturated Tertiary sandstones with good oil-reservoir properties. In later years 267,063 additional hectares (659,913 acres) were acquired in government concessions to the south and to the north of Texas Petroleum's fee lands. Two of these concessions, Ermitaño and Palagua, are presently in the exploration stage. The remaining five are applications accepted by the Government but contracts have not been signed.

A thick layer of alluvium and young Tertiary sediments camouflage the structure making surface geology impossible in the low lands, consequently extensive geophysical studies (torsion balance, gravity and seismic) have been made in the area from 1930 to date.

The Velásquez structure is essentially a southeast-dipping monocline intersected by normal faults. The oil in Velásquez field is trapped against a western boundary line which is thought to be a fault. The entire production is obtained from Tertiary continental beds; it is assumed that at least the greater part of the oil migrated from Cretaceous source beds in the east.

First drilling . . . Location of 1 Velásquez, the discovery well, was based on seismic information. This well, the first drilled by Texas in Colombia, was spudded on December 8, 1945. Drilling terminated July 14, 1946, at total depth of 8,455 ft. in igneous basement. A period of extensive testing followed and 1 Velásquez was subsequently completed as a flowing producer on November 29, 1946, with an initial production of 422 bbl. per day of 27.4° A.P.I. oil through ¼-in. choke. Since that date 1 Velásquez has flowed a total of 875,465 bbl. of oil. It will still produce clean oil at a flowing rate of 450 bbl. per day.

Wells . . . To date 71 have been drilled in Velásquez field. Five were mechanical failures, twelve were dry holes. Cumulative oil production is 5.4 million barrels. Since early exploitation the field production has been restricted by the limited outlet.

The first oil was shipped from Velásquez field on February 3, 1949, by river barge to the Barrancabermeja refinery. Prior to that date oil was produced for fuel and testing only.

Pipelines . . . In March, 1952 a combination 4 and 6-in. pipe began transporting crude 41 miles south to the Esso Colombiana refinery in La Dorada. At present the entire capacity of that refinery, ±3,500 bbl. of oil per day, is supplied by Velásquez field. In addition, an average of about 1,500 bbl. of oil per day is still transported by river barge to the Empresa Colombiana de Petroleos refinery (operated by International Petroleum Co.) in Barrancabermeja.

A 112-mile 12-in. pipeline, which will have a capacity of 31,000 bbl. per day and which may be increased to 45,000 bbl. per day by the addition of an intermediate booster station, is presently being constructed to transport Velásquez crude to the Barrancabermeja refinery and the Andian National Pipe Line Terminal at Galan which will provide an outlet to the Caribbean Sea.

To date approximately Velásquez 3,300 acres have been proven with neither the northern or southern limits of the field defined. Four drilling rigs are currently being used to develop the field on a 30-acre spacing. In 1951 wildcatting in the Guaguaquí property outside of Velásquez field area started. Since then a total of eight wildcats have been drilled, but so far no commercial production has been obtained from outside of Velásquez field.

Drilling and Production Practices

In drilling Velásquez wells, 9⅝ or 10¾-in. surface casing is cemented through surface sands and gravels to about 700 ft. Prior to setting the second string of casing (8⅝ or 9¾ in.), hole is drilled to total depth, usually to basement, which varies from 5,900 to 8,400 ft. One wildcat well was drilled to 13,580 ft. with 12,888 ft. of open hole.

Five and one-half or 7-in. casing

HEAVY PAY LOADS are moved quickly and easily over the excellent road system that Texas Petroleum has built throughout Velasquez field.

is set below the lowest prospective producing zones and cemented, usually in two stages, with the total cement column being as great as 3,500 ft. at times.

Mud properties . . . Oil-emulsion mud is used; average properties while drilling through the pay are: water loss less than 5 cc., weight less than 72 lb. per cu. ft., viscosity 50 to 70 seconds, gel rate 0-3, resistivity about 0.6 M^2. Abundant fresh-water sands, which extend to within a very few hundred feet of the oil-bearing sands, result in rather high mud resistivities (about 6 M^2) which, if not reduced, seriously jeopardize quantitative electric-log analysis. Dirty sands require that low mud weights and low water losses be carried to minimize the possibility of blocking productive sands.

Because of lenticularity of the sands and lack of positive individual sand correlations, sands belonging to one stratigraphic or geologic group are correlated as a unit, and then gun perforated and completed together, and produced as if they were one reservoir.

Two tank batteries, each with a capacity of 6,000 bbl. per day, are already in operation; a third is under construction. Sales contracts require that crude be desalted to 15-25 lb. salt per thousand barrels. This is accomplished in one battery with jug heaters and gun barrels; in the other flow treaters are used.

When individual well production drops below 200 bbl. of oil per day, paraffin is usually deposited in the tubing above about 1,600 ft. and in the flow lines downstream from the chokes. The paraffin is removed from the wells by wire-line paraffin knives.

Initial production from 10-20 per cent of the wells is hampered by sand production. This requires the sand be washed or cleaned out of the casing and tubing. No difficulty has been experienced, however, in the production batteries from sand production.

No major forms of corrosion have been detected to date.

Field Characteristics

Production is obtained from dirty, lenticular sands which alternate with water-bearing sands. Permeabilities vary between 10-1,000 md., and average 111 md. The crude gravity varies 18°-29° A.P.I. Gravity in the northern (shallower) end of the field is generally the lowest.

Saturation pressure is about 1,900 psi. The low gas-oil ratios and early reservoir pressure-production history are characteristic of liquid expansion production from an undersaturated reservoir. Initial flowing well potentials are 100-1,200 bbl. of oil per day, and average 450-500. Some wells exhibit little or no decline; others decline rapidly and die.

Net total pay sand thickness in individual wells varies between 17 and 578 ft.; oil sands occur between 4,150 and 8,400 ft.

Facilities and Services

Only Schlumberger and Halliburton services are provided in the field; services normally performed by other service companies are administered by company personnel.

Two bachelor camps are maintained for both staff employes and laborers, one at Puerto Niño and the other at Velásquez. Plans for a family camp are being studied but no families live in the field at the present. Weekly air transportation is furnished for all staff employes to Bogotá where most of their families live.

In order to operate in Velásquez field, the company maintains complete machine-shop facilities, garage, diesel-engine repair shop, heavy-equipment maintenance shop, extensive warehousing, electric-power plants, drilling and cleanout tools and rig-repair shop and platform, complete construction facilities and equipment, welding shop, sawmill and logging, boats, boat ways, air strip (which services air taxis and occasionally other air lines in addition to company planes) staff and laborers' quarters and mess halls for approximately 141 staff employes and 821 laborers, electrical and communications repair shop, radio stations, complete medical facilities, as well as industrial and potable water systems.

Oil Concessions and Private Property

The Colombian oil code provides two basic systems under which oil can be produced: either from private property with titles recognized by the Colombian Supreme Court or government-granted concessions. West of the Eastern Andes, after a concession contract is obtained, 5 years are allowed for exploration. This period may be extended with special approval under certain circumstances. After an additional 30 years for exploitation which in some cases may be extended an additional 10 years, the concession and all its facilities revert to the Government.

For Texpet's concessions in the Middle Magdalena Valley, in addition to a yearly rental fee, a royalty of 8 to 9 per cent has to be paid to the Colombian treasury on crude shipped outside of Colombia for refining or exported refined products. Such limitations do not affect oil produced from the fee property. Fee property oil can be produced as long as it is economically feasible; the only taxes on the Velásquez fee property production is a 1 per cent tax on exported Velásquez crude or on crude refined in the Barrancabermeja refinery.

Other Drilling Programs

Texas Petroleum Co. produces two other smaller fields in Colombia (Tetuan and Ortega in Department of Tolima) which are being tested by a small 1,000-bbl. per day refinery. Active wildcatting when seasons permit and preliminary planning for a possible pipeline from Barrancabermeja to the Caribbean Coast indicate Texas Petroleum is looking forward to an active successful future in Colombia.

"Initial flowing well potentials are 100-1,200 bbl. of oil per day, and average 450-500."

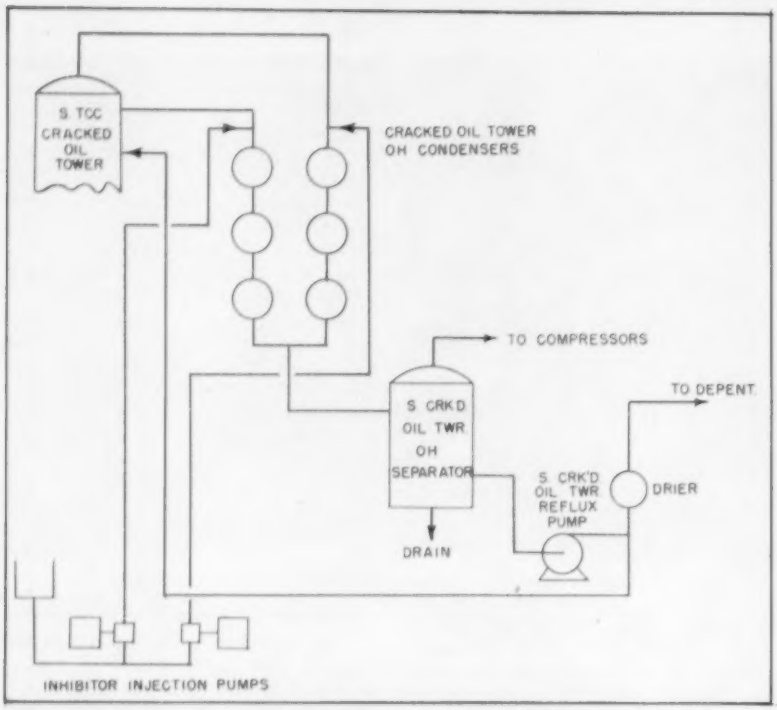


Fig. 1—Serious fouling due to corrosion occurred in condensing equipment of South T.C.C. unit at Pure Oil Co.'s Nederland, Tex., refinery.

How Corrosion Inhibitor Solved Refinery Fouling Problems

by N. S. Banta and C. A. Murray

MUCH has been said concerning corrosion of refinery equipment where metal losses have caused serious structural failures or leaks resulting in shutdown of operations for repairs. Relatively little has been said or written concerning corrosion of refinery equipment where corrosion product fouling has caused excessive pressure drops and decreased heat transfer necessitating shutdowns of operations for cleaning.

In one case given here, a small day-by-day accumulation of corrosion products caused serious fouling of heat-exchange equipment. Results obtained by use of a corrosion inhibitor to reduce this fouling are given. In the other example, corrosion products caused formation of a stubborn emulsion which not only was hard to break, but which was carried further downstream to produce fouling elsewhere in the system. Results obtained by the use of a demulsifying chemical in conjunction with a corrosion inhibitor to reduce this fouling are presented.

Authors are with technical division, Pure Oil Co., at Nederland, Tex. Paper presented at W.P.R.A. regional meeting, Beaumont, Tex., February 10-11, 1955.

In the first case which occurred on the South T.C.C. unit at this refinery, a serious fouling developed rapidly in the overhead system of the cracked-oil fractionating tower. The fouling occurred in the overhead condensing equipment after a few weeks' operation. It consisted chiefly of metallic sulfide corrosion products.

Excessive pressure drops . . . Metal loss itself was not limiting to the operation. Life experience of tube bundles averaged 3 to 4½ years. Replacements were planned for and made during regular shutdown periods. While the equipment was not severely damaged, the products of corrosion, iron and copper sulfides, lodged in bundles and gave rise to such excessive pressure drops that it was necessary to take an unscheduled shutdown for cleaning after only 3 to 4 months on line.

Flow diagram . . . The system involved in this case is shown in Fig. 1. The cracked-oil-tower overhead vapors, consisting of gasoline and lighter gases from the T.C.C. cracking reaction, leave the tower in two parallel streams. Each of the streams passes through a bank of three condensers in series. The fouling and pressure drop occurred in these six condensers.

TABLE 1—SOUTH T.C.C. CRACKED OIL TOWER OVERHEAD PRODUCTS

	Lb./hr.	Day basis
Case charge	113,100	8,080 B/D
Wet gas	28,100	5.8 MM s.c.f./D
Reflux + gasoline	87,700	8,100 B/D
Steam	4,240	
Hydrogen sulfide	540	
Carbon dioxide	860	
Ammonia	2	

TABLE 2—NORTH T.C.C. CRACKED OIL TOWER OVERHEAD PRODUCTS

	Lb./hr.	Day basis
Case charge	132,000	10,600 B/D
Wet gas	22,000	4.6 MM s.c.f./D
Reflux + gasoline	85,200	7,900 B/D
Steam	3,850	
Hydrogen sulfide	290	
Carbon dioxide	470	
Ammonia	2	

Table 1 gives pertinent data on overhead products from the South T.C.C. cracked-oil tower. This stream consists of 115,800 lb. per hour of hydrocarbons and 4,240 lb. per hour of steam together with 540 lb. per hour of hydrogen sulfide and 860 lb. per hour of carbon dioxide. Ammonia is also present in this stream as a result of the cracking of nitrogen bodies of the case charge. This ammonia is sufficient to provide a substantially neutral pH when the steam present is condensed to water.

Why inhibitor? . . . In view of the rapid accumulation of corrosion products it was evident that the ammonia present did not completely suppress metallic sulfide formation. Use of a corrosion inhibitor appeared to hold the best promise of substantially reducing corrosion attack. We believed the corrosion inhibitor might be of benefit in two ways. First, the inhibiting action would lower the corrosion rate and hence reduce the rate of fouling. Second, the corrosion inhibitor would inhibit the particle growth of insoluble corrosion products and thus tend to keep them suspended in the liquid stream.

On the strength of these considerations we made arrangements to introduce chemical inhibitor into the overhead stream on a continuous basis by means of a small proportioning pump. The inhibitor was of the semipolar organic compound type which is adsorbed from oil solution to form a protective film on metal surfaces. The inhibitor injection was started in September 1953. After large initial doses of inhibitor to establish a protective film on metal surfaces, a regular dose of 2 gal. per day was established (1 gal. per 4,000 bbl. gross overhead plus reflux product—6 p.p.m.).

Fouling reduced . . . Results to date have been very satisfactory. Fouling and pressure drop have been sufficiently reduced so that it has not been necessary to take an unscheduled shutdown to clean the bundles. The degree of fouling which has been observed when the bundles were opened for general inspection after a year of operation has been comparatively minor.

Economic justification for the inhibitor injection may be readily evident from the savings which accrue from avoiding an unscheduled shutdown plus extending the life of the particular tube bundles involved. Nonetheless, it is felt worth while to indicate other savings.

There is a definite advantage to be gained in heat-transfer improvement with inhibitor injection. Since corrosion and fouling are less there is little doubt that corresponding dirt factors for bundles are less. Not only is heat transfer improved during the operating period, but scheduled shutdowns may be planned independent of the fouling problem. Corrosion and antifouling protection, it should be emphasized, may well extend downstream of the point of injection practically as far as the liquid stream continues.

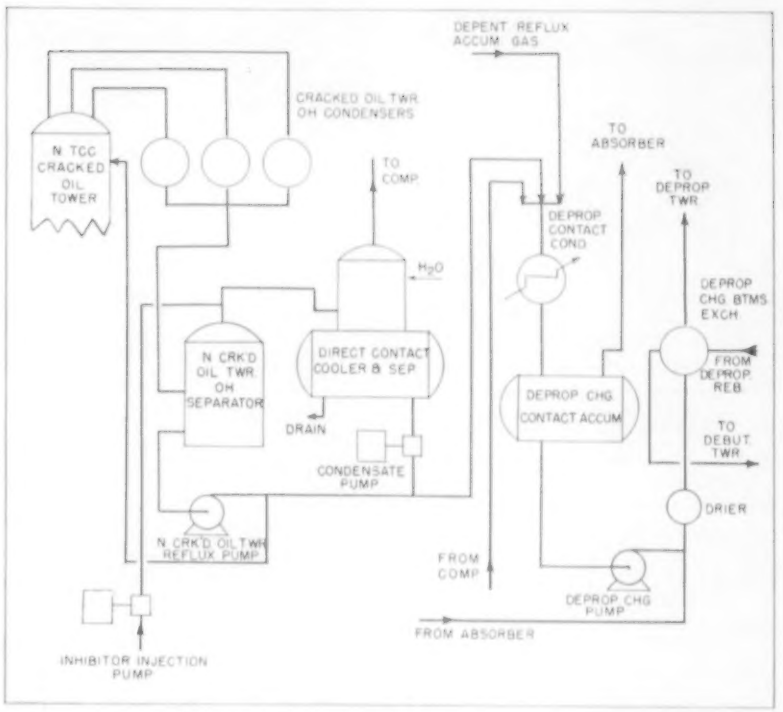


Fig. 2—In the condensing system of the North T.C.C. unit an emulsion formed in the contact condenser. Here a demulsifier and a corrosion inhibitor were used to improve operation.

Emulsion Problem

In the second example, an emulsion problem developed after facilities were installed to increase condensing capacity on the cracked-oil tower overhead to the North T.C.C. unit at this refinery. In order to increase condensing capacity, a direct contact condenser and separator were installed downstream of an existing overhead separator.

Condensing system . . . A flow diagram of the system is given in Fig. 2. The cracked-oil-tower overhead vapors, consisting of gasoline and lighter vapors from the T.C.C. cracking reaction, leave the tower in three parallel streams. Each of the streams passes through one condenser and then all three streams combine in a gas-gasoline-water separator. The overhead from this separator is fed to a contact condenser and separator. The gasoline streams from the two separators are combined and further on are joined by depentanizer reflux gas and gas from first and second-stage compressors. The combined gas-gasoline stream then passes through a depropanizer charge contact condenser, a depropanizer charge accumulator, a coalescing drier, a depropanizer charge-bottoms exchanger, and finally enters the depropanizer tower.

Table 2 gives data on overhead products from the North T.C.C. cracked oil tower. This stream consists of 107,200 lb. per hour hydrocarbons and 3,850 lb. per hour of steam together with 290 lb. per hour of hydrogen sulfide and 470 lb. per hour of carbon dioxide. Ammonia present in this stream is sufficient to provide a substantially neutral pH when steam is condensed to water.

Contact condenser emulsion . . . Shortly after installation of the contact condenser and separator, rapid fouling and pressure drop increase became evident at the coalescing drier and at the depropanizer charge-bottoms exchanger further along on this stream. The water draw from the separator also contained excessive amounts of entrained gasoline.

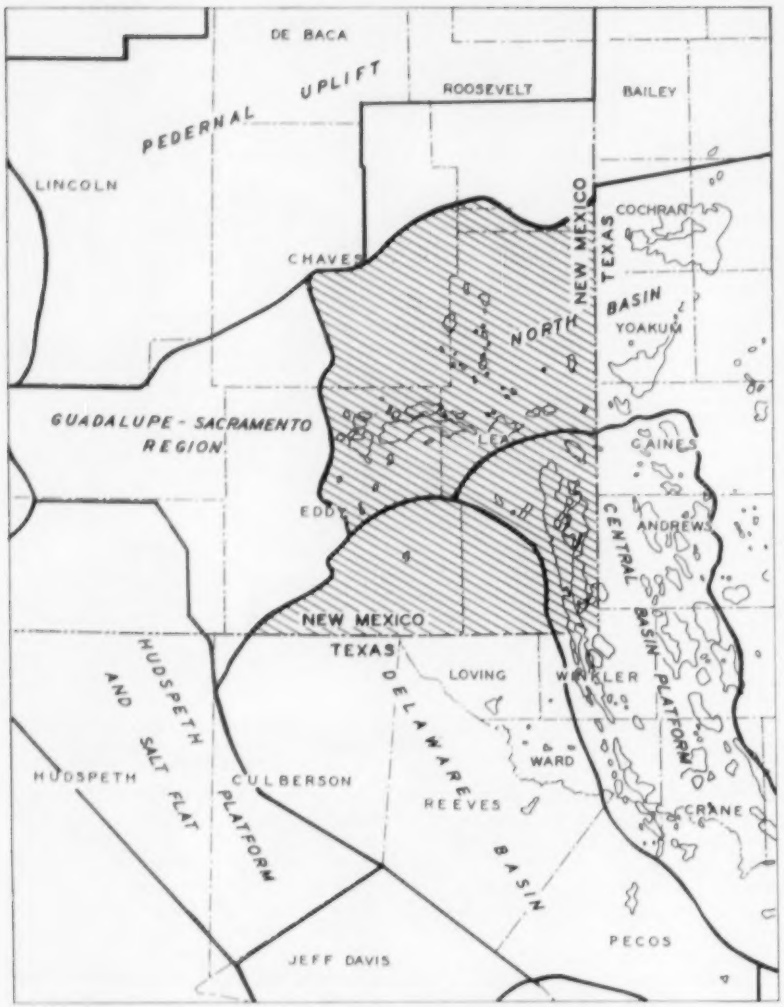
Laboratory tests were made on the fouling material and showed the solids to consist of metallic sulfides plus silica. The sulfides were chiefly the product of iron corrosion. The silica apparently originated in the river water used in the contact condenser.

The emulsion formed in the contact condenser had two detrimental results. In the first place an excessive amount of gasoline was lost from the separator to the drain. Secondly, a small amount of emulsion was continuously carried along with the gasoline stream into succeeding equipment. The emulsion was partially broken by the coalescing drier and as a result fouled the coalescing medium of the drier. The remainder of the emulsion was broken down when it came in contact with heat in the depropanizer charge-bottoms exchanger, leaving a fouling deposit.

Demulsifier plus inhibitor . . . To alleviate the difficulties associated with the emulsion as quickly as possible and without shutdown of the unit, we made provisions to inject a demulsifying chemical and corrosion inhibitor compound into the stream ahead of the contact condenser. We felt that the demulsifying chemical would act to break the emulsion and allow products of corrosion already formed to leave the system with the water phase. The corrosion inhibitor would act to prevent the formation of additional corrosion products which might cause fouling and pressure drop further on in the system.

Dosage . . . The chemical was introduced on a continuous basis by means of a small proportioning pump. After initial large doses to establish a protective film on metal surfaces, 2 gal. per day was set as the regular dosage (1 gal. per 4,000 bbl. gross overhead plus reflux product—6 p.p.m.).

Immediate improvement following the chemical injection was impressive. Separator water became clear of oil, indicating very distinct separation of water and oil. Entrained water was no longer evident in the gasoline stream. Further short time increase in pressure drop and loss of heat transfer did not occur at any point in the depropanizer feed stream.



THE SHADED AREA is New Mexico's most active. The mud problems differ from one basin to the next, and often from one field to the next.

Here's an excellent summary of . . .

What Drillers Have Learned About Mud in New Mexico

by W. E. Schultz

Certainly, the activity in Southeast New Mexico will be growing. As wells go deeper, the mud programs will have to be tailored to deal with abnormal pressures on the one hand and with loss of circulation on the other. Knowing what to expect will help avert many troubles. This article summarizes today's knowledge about the mud problems and practices in that area.

THE New Mexico area discussed in this paper is the southeastern part of the state. It includes Lea County and parts of Eddy and Chaves counties to the west and a portion of Roosevelt County to the north. The major tectonic features in this area all extend into West Texas. They are the Delaware basin, Central Basin platform, the area north of the Central Basin platform and Delaware basin, referred to as the North basin, and the Matador arch at the extreme northern boundary.

The earliest and most extensive development of this area was in shallow formations of upper Permian age. The fields lie in what is now referred to as the Artesia-Vacuum trend in northeastern Eddy County and Central Lea County. At the same time there was also development in shallow Permian formations on the Central Basin platform in southeastern Lea County. From discovery of Artesia field in 1923 until 1944, wells drilled to shallow depths of 1,500 to 5,000 ft. in the Guadalupe series of Permian age. Oil-producing zones in these early wells were the Delaware sand, Yates, Seven Rivers, Queen, Grayburg, and San Andres. Above these producing horizons are the massive evaporites and the red sand and shale beds found throughout most of the area.

The development from 1944 up to the present time has seen wells drilled more than three times as deep as before. Now there are productive zones in formations of Permian, Pennsylvanian, Devonian, Silurian, and Ordovician age. Drilling and mud problems have grown greatly with the deeper drilling.

Central Basin Platform

The Central Basin platform in New Mexico covers about one-fifth of Lea County in the extreme southeast corner of the state. This has been an area of concentrated drilling activity with the numerous fields forming a trend in a north-south direction. The Permian formations are uniform in thickness throughout the platform area, but they thicken gradually to the north into the North basin. On the west flank of the platform, beds dip steeply into the Delaware basin.

Pre-Permian formations are faulted and folded with steeply dipping beds in some areas. Erosion after Pennsylvanian time left little Pennsylvanian on the platform and older formations underwent localized erosion in faulted and folded areas. There are also erosional unconformities in Pre-Pennsylvanian formations and through the older formations of Paleozoic time.

Mud programs and problems . . . The

Author is with Shell Oil Co., Midland, Tex.

mud programs in the platform area are divided in three groups depending on the casing program used. The different casing programs use these combinations: (1) surface casing and production casing; (2) surface casing, short intermediate casing, and production casing; and (3) surface casing, intermediate (salt) casing, and production casing.

The program needed in a particular field depends on well depth and localized conditions, such as high-pressure gas and lost circulation. The incompetent red sand and shale beds above the massive evaporite section also affect the casing programs used.

Surface, production strings . . . The first casing program given above (i.e. surface and production strings only) is used in shallow wells, normally of not more than 5,000 ft. The mud programs are relatively simple, although troubles often occur from erosion and caving of the evaporite and red shale formations. These difficulties are sometimes made worse by gas "kicks" or blowouts from the Yates formation. Also, adding to the blowout and caving problem, are charged upper formations around older producing fields. These charged zones make an abnormal pressure gradient often hard to control.

The surface casing is normally 300 ft. or less in depth. Fresh water clay or bentonite is mixed for spudding. It is also used to get an A.P.I. funnel viscosity of 50 or better for drilling the surface sands and shales. This mud is discarded after drilling out of the surface casing. Then, a native red shale mud is used. It is continuously diluted with water for maintenance of an A.P.I. funnel viscosity of 35 to 40. The Rustler anhydrite formation lies below the red sand and shale beds at depths from 1,200 to 1,600 ft.

Below the Rustler the hole drills through the massive salt section containing stringers of anhydrite and shale. After that, the Yates sand is drilled at about 2,800 ft. The native "red bed" mud becomes saturated with salt when drilling the massive salt section. Its weight will be 10.5 to 11.2 lb. per gallon upon reaching the Yates.

The Yates formation, and sometimes the Seven Rivers formation below, contains gas. The pressures are high enough to gas-cut the native mud. Sometimes serious blowouts result if excessive dilution cuts the mud weight enough. When serious Yates trouble is expected, the second casing program given below is often used for added safety.

On the other hand, a limited amount of gas-cutting in this interval is common; and wells are often drilled to lower formations, such as the Queen, Grayburg, and San Andres, with the gas-cut mud producing occasional kicks but no serious hole trouble.

However, when using a casing and mud program like this, it is important to control water dilution so that the native mud builds up weight to 11.0 to 11.2 lb. per gallon. The weight is needed to control the larger gas accumulations, especially in the Monument area, but also in other known areas of Yates gas accumulation. Starch enriches the native mud to reduce the filtration loss before drilling a pay zone.

Surface, intermediate, oil . . . The second casing program is sometimes used where the Yates gas is known to be a serious problem. In this event, a short intermediate casing is set in the first thick anhydrite stringer of the red sand and shale section above the massive salt section. This string eliminates caving and lost circulation in the incompetent red beds. It also simplifies control of the Yates gas.

In some wells the mud weights are raised to 12 or 14 lb. per gallon in drilling the Yates. A native mud weight of 11.0 lb. per gallon is enough to hold the gas pressure in most cases. However, the driller must use safe drilling practices, such as keeping the hole full at all times and making trips at a reasonable rate. In this way, a native mud can serve to the top of shallow productive zones before starch and salt water clays must be added for completion purposes and setting the production casing.

Surface, salt, oil strings . . . The third casing program is used in the deeper wells in the platform area. In this case the intermediate string becomes a "salt" string and is set in hard lime, below the Yates formation, casing off all of the massive salt section. In drilling the "salt hole" the surface mud pits are cleaned and the volume jetted low before drilling into the salt formation.

Because the salt casing is usually cemented from bottom to top, the mud system is sometimes pretreated with salt to keep down hole enlargement. However, pretreatment is not necessary for good hole conditions. Its economic value, as related to cementing costs, is open to question.

The salt section ranges from 1,000 to 1,200 ft. in thickness. The important consideration while drilling in the salt is in the control of the amount of fresh water added. Proper settling in the surface pits brings down the amount of fresh water needed for dilution.

With the casing string set into the hard limestone below the Yates formation, no appreciable salt is found when drilling below this point in the platform area. Therefore, fresh-water muds can be used.

The formations below the casing point are mostly carbonate rocks with anhydrite stringers. Because of the low permeability of these formations in many fields, clear water can often be used to the top of the producing zone. In some cases, excessive amounts of water, in the order of 100 bbl. per hour, are lost to permeable zones in the lower San Andres, Glorieta, and Clear Fork formations. These cases require "mudding up," but rarely use excessive amounts of fibrous and flake materials to seal off.

Chemical treatment of the fresh-water muds is necessary when drilling below the intermediate casing and through formations of Permian age. All of these have large quantities of anhydrite stringers. Therefore conventional low-pH-soda ash, low-pH-caustic quebracho-CMC, and high-pH-caustic-quebracho muds are used through the contaminating formations.

Little contamination is found in pre-Permian formations. When it will not interfere with sample analysis, crude oil or diesel oil is added to the above mud systems to get better mud properties and drilling performance.

Mud weights and viscosities are normally low—9.0 to 9.5 lb. per gallon and 35 to 45 seconds per quart. Water losses range from 10 to 20 cc. per 30 minutes, and are reduced in pay zones. There are a lot of shales in pre-Permian formations, along with steeply dipping formations in faulted and folded areas. The result is hole trouble, but this is normally corrected with higher viscosities and lower water losses. Mud viscosities are often raised to 60 to 70 A.P.I. with water losses below 8 cc. in 30 minutes.

Circulation is often lost in the vugular and fractured formations. However, the losses are usually not extreme, and can be sealed with fibrous, flake, or granular materials.

North Basin

The North basin covers northeastern Chaves County, southern Roosevelt County, and most of Lea County. Generally, the western flank of the basin dips as a result of uplifting in the Guadalupe-Sacramento mountainous region to the west. Formations of Permian age get thicker to the north towards the deeper portion of the basin or shelf. Then, they thin slightly to form a slight arch at the Matador uplift.

At the extreme west, erosion has removed some of the upper Permian formations, such as the red sand and shale beds and the massive evaporite section. Salt deposits occur in Permian formations of upper Leonard age in the northern part of the basin but not in the southern part. Pre-Permian formations are faulted, and there are erosional

BP POWERS THE PLANES

BP MEANS POWER in the air ; power both for supersonic jets and piston-engined aircraft.

The BP Aviation Service provides the power for many well-known national airlines. Its green and yellow symbol stands for swift and efficient service on airfields in places as far apart as Iceland and Fiji.

In the air, on land and at sea, BP products and BP research are speeding the pace of progress all over the world.

The BP Shield is the symbol of the world-wide organisation of

The British Petroleum Company Limited

(PREVIOUSLY ANGLO-IRANIAN OIL COMPANY, LIMITED)

"There are a lot of shales in pre-Permian formations (of the Central Basin platform) . . . The result is hole trouble. Probably the best-known trouble-making shale in the (North) basin is the Woodford . . . The beds of Permian age (in the Delaware basin) are very thick . . . These thick beds make a basis for deep abnormal-pressure zones. Lost circulation adds to the problem."

unconformities in the older formations of Paleozoic time.

Mud programs and problems . . . The upper Permian red sand shale beds and massive evaporite section are present in the major part of the North basin, and specifically in the main area of activity. As a result, the same casing and mud programs are used in these upper formations as in the Central Basin platform area. For this reason, the discussion will focus on the drilling and mud problems of the deeper drilling common in the recent development in the basin.

In the deeper wells in the basin, the surface casing usually is set at 350 ft. or less. The intermediate (salt) casing is set into the top of the San Andres carbonate rock, normally at 4,000 to 5,000 ft., thereby excluding the upper sands and shales and the massive evaporite section.

Clear water can be used below the intermediate point. In some fields it is used to depths as great as 10,000 ft. before drilling enough shale of permeability to require mudding up. Normally a mud is required before drilling the Wolfcamp formation of basal Permian age, as this zone has shale stringers to cause hole trouble.

Below this, there is trouble-making shale in formations of Pennsylvanian and Mississippian age. Probably the best known trouble-making shale in the basin is the Woodford shale of basal Mississippian age. Also a trouble maker is the Abo shale of lower Leonard age; it is worst in the northern part of the North basin at depths of 7,000 to 8,000 ft.

Where to mud up . . . The depths below the intermediate casing point at which a drilling mud is necessary, therefore, vary considerably in the North basin. As in the Central Basin platform area, all of the formations of Permian age contain anhydrite; and large chemical treatment is necessary when fresh-water muds are used.

The fresh-water mud are of the low pH-caustic-quebracho, low pH-caustic-quebracho-CMC, and high pH-caustic quebracho types. Through the Permian formations to about 10,000 ft. these fresh-water muds are generally 8.8 to 9.5 lb. per gallon in weight, 35 to 50 A.P.I. funnel viscosity, and 10 to 15 cc. in 30 minutes water loss. In drilling through pre-Permian formation to depths below 13,000 ft., the funnel viscosity is normally raised uniformly as high as 70 to 90 seconds A.P.I. Mud weights are usually kept low except in specific abnormal pressure areas. Water losses range from 5 to 10 cc. in 30 minutes.

Salt-water muds are necessary when mudding up below the intermediate casing point in the northern part of the North basin, because of salt deposits at 5,000 to 7,000 ft. in the Yeso formation.

The muds are saturated with salt very shortly after encountering the salt stringers. With further drilling and dilution with fresh water, the salt content gradually lowers to approximately 25 per cent of saturation in some 4 to 5 weeks.

Pretreatment with salt is expensive and not necessary for good hole conditions. The salt-water muds are simply made up of salt-water clays for building viscosity and starch for reducing water loss. Since the salt content stays above 20 per cent only a short time, a starch preservative is also necessary. The mud is generally 9.8 to 10.2 lb. per gallon in weight, 40 to 60 A.P.I. funnel viscosity, 5 to 15 cc. water loss in 30 minutes.

Crude oil or diesel oil is added to both the salt-water and fresh-water mud systems when sample interpretation will permit. The oil improves mud properties as well as drilling performance.

Troubles met . . . Crooked hole and lost circulation, in addition to the shale already mentioned, are probably the two main troubles in North basin drilling. Abnormal pressure zones have been drilled, resulting in blowouts and fires. These zones may add to the lost-circulation problem in the future.

Lost circulation occurs mostly in the lower Wolfcamp and Pennsylvanian carbonate formations. However, losses do occur in upper Permian and pre-Pennsylvanian formations as well.

Denton field in northeast Lea County is the best example of the lost-circulation problem in the North basin. Some of the most difficult and severe lost circulation in the United States has occurred there. The losses are frequent and great in magnitude. Many methods have been used to combat them. No correlation or trend of lost circulation is apparent. Losses are scattered throughout the entire field.

The zones of loss are in the Wolfcamp and upper Pennsylvanian formations covering an interval of 1,200 ft. Likely, the carbonate rocks in this interval contain large solution cavities, judging from 2 to 5-ft. drops of the bit and from drilling breaks of 1 ft. per minute.

Complete losses usually come abruptly with drilling breaks or "rough" drilling. The static fluid level in the hole remains at about 1,000 ft. with mud weights of 8.4 lb. per gallon. Oil-emulsion muds weighing as little as 7.9 to 8.0 lb. per gallon have been used without helping solve the problem.

All types of lost-circulation additives, plugs, and techniques have been tried in the field, without complete success in any case. Generally, the conventional bulk materials, plastic and granular materials, and various other bridging materials such as shredded tires, rope, alfalfa hay, wood timbers, cotton, and other drillable materials show no results. Various types of cement plugs helped in some cases, but not without a lot of material and time expended.

Bentonite-oil plugs and clay-cement plugs are not entirely successful, although a combination of the bentonite-oil plugs followed by cement has given better results than conventional cementing methods in some cases. After a reasonable number of plugs have been placed but have failed to accomplish results, it has become the practice to blind drill ahead with water.

Blind drilling . . . In blind drilling ahead, about 100 bbl. of high-viscosity bentonite-water mixture is normally spotted on bottom before making each trip. In this way the holes are kept relatively clean, and drilling proceeds for about 1,000 ft. before running a protective string of casing through the lost-circulation zones.

Blind drilling ahead with water has given partial returns in a couple of wells by the deposition of drill cuttings in the cavities. A complete seal was obtained by adding high concentrations of bulk materials, or by subsequent spotting of cement. To say the least, blind drilling with water has become a recognized and effective method of combating cavernous losses of the "Denton type."

Delaware Basin

The northern part of the Delaware

with GEESE or GAMMA RAYS...

...it takes

EFFICIENCY

for accurate results

McCullough RADIATION WELL LOGGER

with SCINTILLOMETER® (Gamma Ray and Neutron Logs)

Short, solid type McCullough Scintillometer® has an efficiency approaching 100% in measuring radiations. Logs thick or thin beds with sharper, clearer detail... repeats accurately... has greater stability ... assures more positive quantitative interpretation... correlates better with cores and electric logs. Write for details.

McCullough

TOOL COMPANY

LOS ANGELES • HOUSTON • EDMONTON

OVER 40 OIL FIELD SERVICE BRANCHES

SERVICE ANYWHERE—ANYTIME

basin extending into New Mexico covers southwestern Lea County and southeastern Eddy County. Here are the characteristics of the eastern side of the basin, bounded by the Central Basin platform. There is a thickening of the Ochoa series of upper Permian age. The Guadalupe series grade from carbonate rock on the platform to sand and shale in the basin. The Leonard series thicken and have facies changes from mostly carbonate rock to large percentages of shale and sand. There are extremely thick shale and sand sections of Wolfcamp age, and much shale deposition of Pennsylvanian age.

The western flank of the basin is gently dipping as a result of the Guadalupe and Delaware uplifts during Tertiary time. The northern boundary, dividing the Delaware basin and North basin is formed by a series of carbonate reefs. These were deposited at the northern margin of the basin during the Leonard epoch and in succeeding Guadalupe time.

Mud programs and problems . . . The beds of Permian age are very thick. So are formations of Pennsylvanian age. These beds are mostly shale and sand; but, deeper, there are lesser carbonate rock formations. These thick beds make a basis for deep abnormal pressure zones. Lost circulation adds to the problem.

The Delaware basin of New Mexico, with the exception of limited drilling in the very shallow formations of upper Permian age, was unexplored until recently. Now, wells are being projected to the extreme depths of the basin. Drilling and mud problems promise to be tough

The newness of drilling activity in the basin prevents setting a standard casing and mud program. However, a few generalizations can be made. At the eastern flank of the basin, surface casing is set into the Rustler anhydrite at about 1,200 ft. Circulation has been lost in the surface sands and shales at between 400 to 800 ft.

An intermediate string is set into the top of the Delaware limestone at about 5,200 ft., casing off the massive salt section. Sulfur water has flowed from the Castile formation at about 3,800 ft. A mud weight of about 12.0 lb. per gallon was needed to overbalance the flow.

The salt-saturated native mud made when drilling the massive salt section has a weight in the range of 10.5 to 11.0 lb. per gallon, so it requires weight material.

A low-pH-caustic-quebracho mud with CMC has been used below the intermediate casing point to the Wolfcamp at approximately 11,500 ft. Mud in this interval is 9.0 to 9.5 lb. per gallon in weight, 40 to 60 A.P.I. in funnel viscosity, and 10 cc. of water loss in 30 minutes.

Higher-pressure zones have been drilled in the lower Wolfcamp and Pennsylvanian formations below 12,500 ft. In future wells where lost circulation is expected it may be necessary to set an additional casing string just before drilling this zone.

Another casing program . . . Other casing programs in the central and north part of the basin generally have four strings. There is a short surface casing of 400 to 600 ft. set into the Rustler anhydrite. An intermediate (salt) string is set through the massive salt into the Castile or Delaware limestone. Then, an additional string is set in lower Bone Springs limestone before running production casing.

The mud properties in the surface and salt sections are the same as given previously. There has been minor lost circulation in Delaware formations before reaching the third casing point. However, there has been little trouble, and lightweight, low-viscosity muds can be used.

The final hole trouble met has been below the third casing point. In one well high-pressure salt water flowed from 12,600 ft. To control the flow required a mud weight of 11.8 to 12.0 lb. per gallon. Perhaps the greatest difficulty below the third casing point is lost circulation of the high-density fluids needed to control gas and salt water flows in basal Wolfcamp and pre-Permian formations.

Low pH-caustic-quebracho muds with CMC and lime muds have been used in recent Delaware basin wells.

More Drilling With Fewer Rigs

MORE footage and more wells are being drilled with fewer rigs. This was the drilling trend last year with contractors doing 92 per cent of the work. This drilling and cost data, recently released by the American Association of Oilwell Drilling Contractors, tells the story.

DRILLING COST TRENDS—UNITED STATES
(Costs in dollars per foot)

	Total* new wells completed	Average* depth per well	Per cent drilled by contractors	Average contract cost	Average total cost
1935	24,851	2,760	68	5.00	8.00
1936	28,962	2,797	69	4.75	7.75
1937	35,213	2,985	71	4.50	7.50
1938	29,127	3,110	71	4.25	7.50
1939	28,012	3,053	70	4.25	7.50
1940	31,149	3,088	71	4.00	7.50
1941	32,510	3,056	72	4.25	7.25
1942	21,990	3,088	70	4.00	7.50
1943	19,477	3,250	75	4.50	8.00
1944	25,262	3,234	78	4.75	8.25
1945	26,879	3,469	80	5.00	9.00
1946	29,228	3,321	81	5.00	9.50
1947	33,122	3,445	81	5.00	10.25
1948	39,778	3,454	82	4.75	10.75
1949	39,038	3,538	85	4.75	10.75
1950	43,279	3,680	88	5.00	11.00
1951	44,516	3,871	90	5.50	11.50
1952	45,821	4,085	91	5.85	12.00
1953	49,279	4,035	91	5.60	12.50
1954	53,930	4,061	92	5.25	12.50

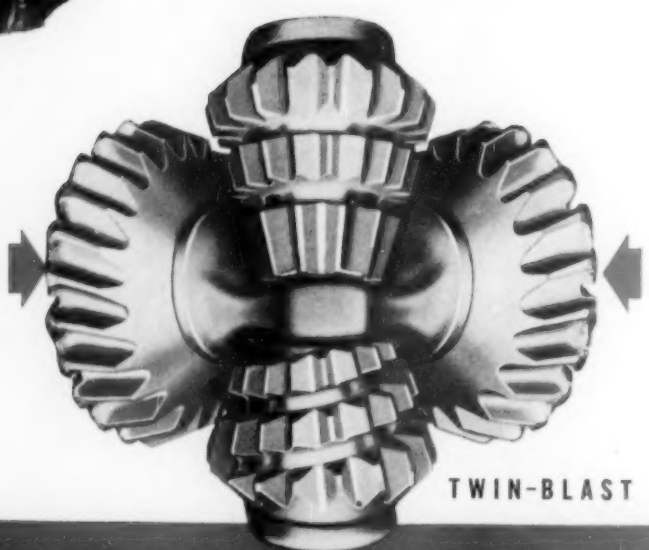
*The Oil and Gas Journal's "Annual" figures, 1943-1954.

DRILLING COST COMPARISONS
(Expressed as percentages of 1941)

	1941	1945	1947	1948	1949	1950	1951	1952	1953	1954
Labor costs	100	140	150	170	180	190	196	197	198	200
Equipment costs	100	110	132	145	160	175	180	183	189	190
Miscellaneous costs	100	120	160	165	170	175	181	185	188	191
Total rotary drilling costs	100	122	145	160	170	180	186	189	192	194
Drilling prices (footage basis)	100	115	110	105	101	100	103	103	102	99
Average drilling time (days)	100	95	85	80	75	65	60	59	58	56
Rate of penetration	100	110	130	140	150	170	180	182	184	188

REE

help



TWIN-BLAST

These Reed Rock Bits have

REED ROLLER BIT COMPANY

D ROCK BITS

solve your crooked hole problems

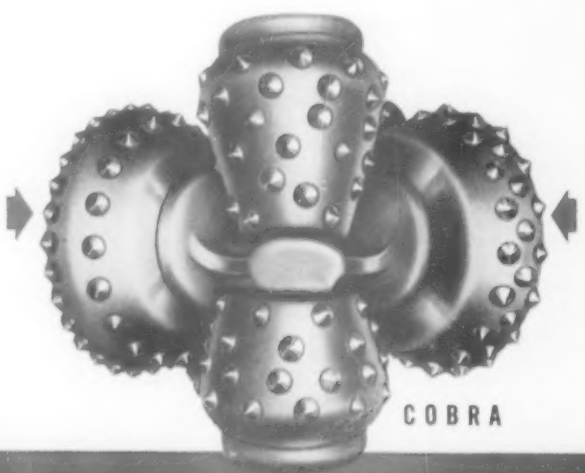
FOR years, it has been known that rock bits with *two gauge cutters* such as the Reed Twin-Blast have a decided tendency to drill straight, vertical hole.

That is the reason so many operators have used these Reed bits to straighten their off-vertical holes.

Now, more and more operators, with better reason, use Reed vertical hole drilling bits right from the start so as to help avoid the troubles, dangers, and heavy expenses connected with crooked holes, and the necessity of having to correct them.

Ask a Reed representative the "reason why."

DMQ



COBRA

two guage cutters for vertical hole drilling

HOUSTON 1, TEXAS

Gulf Coast, Mid-Continent, Rocky Mountain and Canadian Distributor for Martin-Decker Products

THE MARK OF QUALITY

Designing and Applying High-Speed Turbines—6

Controlling Speed: Multiple-Inlet Valves

by H. Steen-Johnson

SPEED control with a single valve was noted in the preceding installment. The next step is multiple-inlet valves. This step results in a different configuration of the speed-control system (Fig. 1).

When considering these speed controls, it should be kept in mind that on machines larger than the small single-stage, considerable power is required to move the governing valves. On a 2,000 or 3,000-hp. rating and up, single or multivalve, a good-sized and fast-acting oil servo with several thousand pounds of push is needed to move the valves. A good speed governor can be completely useless if the rest of the speed-control system is not adequate. The speed governor together with the relays, amplifying devices, servos, and the governing valves have to be designed and sized to work as a unit and be integrated into the physical structure.

The valves here are moved by a double-acting oil servo powered from the main oil supply. The pilot valve controls the oil admission to the piston and is positioned by the small power piston in this amplifying device. The small pilot servo is mounted on the side of the valve servo. This amplifying device picks up the control pressure from the balancing pilot on top of the speed governor. The control pressure is the light color and it acts on the small piston area of the governor pilot to balance the force of the governor weights.

For a speed change, the weights move and the oil admission to the control oil line is changed. The change in control pressure will reset the valves through the amplifying device on the servo. It will act on the balancing pilot to reestablish balance of forces with the speed-governor force.

The speed governor itself is frictionless. In this design, the motion of the governor weights is entirely elastic deformation. The pins are supported in bonded bushings that deflect in torsion. The weight connections to the spindle are springs so there is no relative sliding or rolling with static friction to be overcome. This governor picks up changes of less than 3-4 r.p.m. in 3,600.

The speed-control system is quite new and will be with us for some years to come with various adaptations. For speed governing it has excellent sensitivity and speed of response. And it is readily adaptable to exhaust and extraction controls. The high sensitivity makes it well suited to high-speed turbines when the rest of the speed-control system and the valves are properly sized to function in response to the rapid acceleration of the light high-speed rotors. In these units, the ratio between energy input and rotor inertia is much higher than for 3,600-r.p.m. turbines.

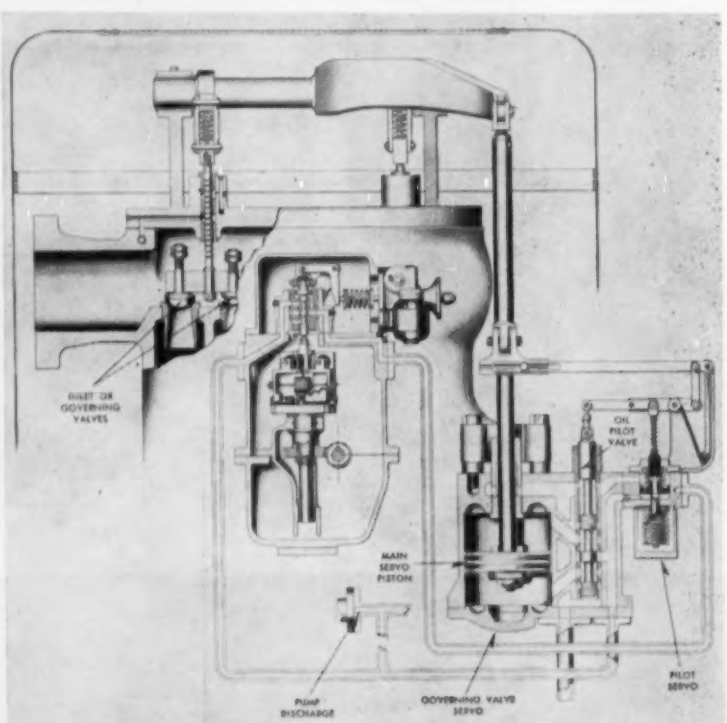


FIG. 1—Speed-governing system for multivalve turbine.

Author is chief engineer, turbine division, Elliott Co., Jeannette, Pa. Paper presented at the petroleum-mechanical engineering conference of the A.S.M.E. held in September 1954, at Los Angeles.

What an opportunity...
...for pumping Economy!

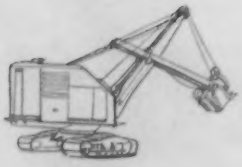
Parkersburg Pumpers combine Peak Performance with less maintenance, less servicing, less down time to bring lifting costs down to an irreducible minimum. Performance records in fields all over the world prove their unequalled efficiency and economy.

Designed and built to deliver this kind of service—and available in 56 sizes and types—you can take advantage of Parkersburg pumping economy, regardless of your well conditions. Ask your Parkersburg Representative to submit details and prices on Parkersburg Pumpers for your needs.

Parkersburg
RIG AND REEL COMPANY
DIVISION OF PARKERSBURG : AETNA CORPORATION

3345 WINTHROP AVENUE
FORT WORTH 16, TEXAS

Caterpillar announces
A NEW LINE OF
TORQUE CONVERTER POWER UNITS



WIDE CHOICE OF POWER UNITS

Engine and torque converter

Engine, clutch and torque converter

Engine, clutch, torque converter and reverse gear

WIDE CHOICE OF OUTPUT SHAFTS

Standard heavy-duty drive for side loads

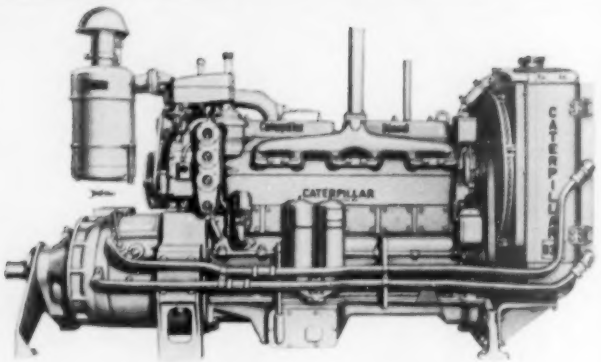
Narrow chain housing for side loads

Wide chain housing for side loads

Output shaft for in-line loads only

Fast Facts About CAT* Torque Converter Power Units

1. **Torque output is automatically matched to the load.**
2. **Loads start smoothly.**
3. **Load movement can be controlled without using the clutch.**
4. **Overloads cannot kill the engine.**
5. **Need no special hydraulic oil—their fluid is engine fuel—fluid level automatically maintained.**
6. **Cat Diesel Engine burns non-premium fuels cleanly and efficiently, even when idling.**
7. **Caterpillar can supply your torque converter requirements from stock.**
8. **Caterpillar Dealers have facilities and parts for servicing torque converters.**



Now, to provide you with a greater selection of power packages, Caterpillar offers a new line of torque converter units. As many as twelve different torque converter arrangements are available for *each* of six Cat Engines, up to 480 HP. Whatever your power needs in draw works, mud, cementing and acidizing pumps and excavators, you'll find the right unit in Caterpillar's complete line.

In offering torque converter power, Caterpillar has combined extensive research with years of practical application in the field. Here are owners' reports of units on actual jobs: "Live and snappy with plenty of power" . . . "We get an abundance of power out of these torque converter power units."

Either as original or replacement power, it will pay you to check the advantages of torque-converter-equipped Cat Diesels. Each is matched to do *more* work at *lower* cost with *less* down time than any competitive unit. Leading manufacturers of oilfield and pipeline equipment can supply these money-makers in the equipment they build.

For complete details, see your Caterpillar Dealer. He has the experience and technical knowledge to help you with your power problems. He has trained personnel who know how to install engines and torque converter power units in oilfield and pipeline machinery. Call him today!

Caterpillar Tractor Co., Peoria, Illinois, U.S.A.

CATERPILLAR*

*Both Cat and Caterpillar are registered trademarks—U

THE NEW STANDARD OF TORQUE CONVERTER POWER

CATERPILLAR TRACTOR CO., PEORIA, ILLINOIS, U.S.A.

Please send me further information on Cat Diesel Torque Converter Power Units

Name _____

Company _____

Street _____

City _____ *Zone* _____ *State* _____

by W. L. Nelson
Technical Editor

QUESTIONS ON TECHNOLOGY

What About Nitrogen in Crude Oils?

"Nitrogen compounds are said to cause the catalysts used in cracking to lose their activity. Are some crude oils worse than others in this respect? What crude oils contain large amounts of nitrogen compounds?"—G.M.C.

The amount of nitrogen is almost the same in all crude oils, although crude oils from California seem to contain more nitrogen than other crude oils, and those from Mississippi may be low in nitrogen. The situation is evident in Fig. 1 which is based on analyses of 153 United States and miscellaneous crude oils (Ball, Whisman and Wenger, Ind. Eng. Chem., 43, page 2577, November 1951) and on 57 analyses of Venezuelan crude oils (George A. T. Thompson, master thesis, University of Tulsa, 1953).

Part of the nitrogen is present in the form of basic compounds and the ratio of basic to total nitrogen is almost constant, ranging from 0.22 to 0.32 for oils which contain 0.1-0.73 per cent total nitrogen. At very low amounts of total nitrogen (below 0.1 per cent), the ratio of basic to total nitrogen is higher being even 0.8 for two samples which contained less than 0.01 per cent total nitrogen.

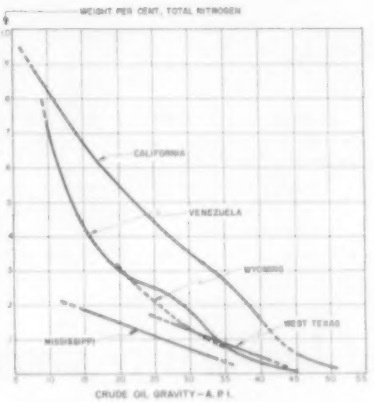


Fig. 1—A comparison of the nitrogen content of California and other crude oils.

Analytical methods may not be dependable at such low percentages as 0.1 per cent.

The Tertiary oils are often considered as high in nitrogen but no such conclusion was possible from the data investigated here. The region (or perhaps origin) of the crude oils appears to be more important than the geologic age. Many California oils are of the Tertiary age and this may account for the belief that Tertiary oils are high in nitrogen. However, many Venezuelan oils that are not high in nitrogen are also of the Tertiary age.

The amount of nitrogen in gasolines and distillates is much lower than in crude oils and this applies even to cracked distillates. The general magnitude of the nitrogen content of distilled materials is indicated in Table 1.

TABLE 1—NITROGEN CONTENT OF PETROLEUM DISTILLATES
(Wankat and Gatsis*)

Type of stock—	Nitrogen, p.p.m. Total	Nitrogen, p.p.m. Basic	Sulfur (per cent)
Straightrun materials:			
Venezuelan heavy naphtha	under 1.0	under 1.0	0.06
Kuwait naphtha	3.1	under 1.0	0.07
Middle East heavy naphtha	under 1.0	under 1.0	0.07
Pennsylvania straightrun gasoline	15.0	3.2	0.04
Pennsylvania straightrun naphtha	3.5	under 1.0	0.03
Pennsylvania straightrun gasoline	2.0	under 1.0	0.03
Pennsylvania straightrun gasoline	5.0	under 1.0	0.05
California naphtha, 168°-230° F.	5.9	1.2	0.02
California naphtha, 288°-360° F.	7.3	3.7	0.16
Wyoming medium naphtha	4.6	1.8	0.07
Wyoming medium naphtha	2.8	under 1.0	0.11
Michigan straightrun gasoline	5.0	2.0	0.12
Michigan straightrun naphtha	5.4	1.4	0.10
Cracked gasolines and naphthas:			
California cracked naphtha	184.0	171.0	1.52
California thermal cracked naphtha	234.0	224.0	1.28
California Santa Maria coker distillate	130.0	62.0	2.35
Mid-Continent medium naphtha	4.1	under 1.0	0.08
Wyoming and West Texas visbreaker naphtha	30.0	19.0	0.57
Wyoming and West Texas visbreaker naphtha	32.0	19.0	0.35
No. 2 fuel-oil components:			
California thermal side cut	56.0	22.0	1.85
Wyoming catalytic side cut	210.0	61.0	1.08
Mid-Continent thermal side cut	224.0	161.0	0.53

*Anal. Chem., Vol. 25, page 1631, November 1953.

Role of the Small Refiner In Petrochemicals

"We are a small refiner. Where can we fit into the petrochemical industry? M.G.S.

So much good material has been written about petrochemicals in The Oil and Gas Journal by our editors, John C. Reidel and F. Lawrence Resen, that this department cannot attempt an authoritative discussion. Nevertheless, Fig. 1, summarizes the situation. It is immediately noted that the chemical and petrochemical industry is a highly integrated one which produces numerous byproducts and which calls for numerous chemical feed stocks or treating agents. Recovery of the byproducts leads to process after process until the small refiner or even a major refiner finds that he must either become a large chemical operator or otherwise confine himself to a few basic chemical raw stocks.

Even such a course is not open to every refiner because he must be located near other chemical manufacturers. Fig. 1 is by no means complete because (1) it shows only one method of manufacture for each product, (2) it does not list the numerous auxiliary chemicals that are needed in small quantity, (3) it fails to show all of the many intermediate materials, and (4) a host of generally less basic operations and products are left out altogether.

Some of the following operations that are best suited to the limitations of the small refiner are not even listed in Fig. 1:

1. Manufacture of highly aromatic cycle stocks or residues for sale to carbon-black manufacturers.
2. Manufacture of sulfur or sulfuric acid from hydrogen sulfide.
3. Recovery and purification of mercaptan sulfur compounds.
4. Separation of straightrun solvents or naphthas.
5. Recovery and purification of

naphthenic acids from caustic solutions.

4. Selective polymerization or the separation of dodecylene, etc., at the polymerization plant.

7. Recovery and separation of cresylic acids from caustic solutions.

8. Sulfonation of kerosine or similar stocks for detergent manufacturers.

9. Recovery of propane and butane.

From this discussion it should not be inferred that a small refiner cannot undertake such chemical operations as manufacturing ammonia, separation of aromatics, etc. Many small refiners do conduct such operations but careful consideration of the particular situation, coupled with unusual sagacity, is required in entering the petrochemical field.

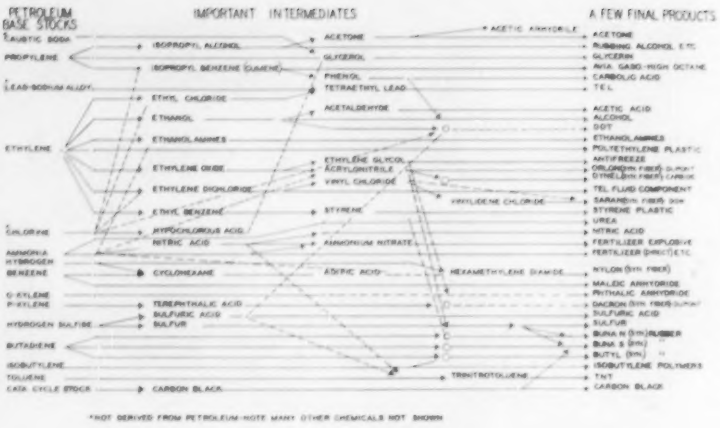


Fig. 1—Some basic petrochemical operations.

What Are Values of Low-Gravity Crude Oils?

"In your answer of November 8, 1954, you show the values of crude oils in relation to the value of 30° A.P.I. crude oil. How about a comparison with the price of Bunker C fuel oil? What are the values of low-gravity crude oils? F.P.D.S.

The market index, as used in the Questions on Technology of November 8, 1954, entitled, "How to Estimate Value of Crude," can be used as a criterion in comparing the value of a low-gravity crude oil with the price of Bunker C fuel oil as indicated in Fig. 1. However, the relationship is not as consistent as the general relationship published on November 8, 1954, which employs a 30° A.P.I. crude oil as the basis.

Oils having a gravity above 13° A.P.I. are worth more than Bunker C fuel oil under substantially all market conditions (market indexes of 2.00 or greater) and their value may range up to 30 per cent or even 50 per cent more than Bunker C fuel oil. However, if the price of Bunker C fuel oil is high compared with the price of gasoline as in 1934, 1940, 1946, and 1948 (i.e., market indexes of 1.75-2.0) the low-gravity crude oils are worth scarcely more than Bunker C fuel oil and may even be less valuable (see the lowest lines on Fig. 1).

The market index used in Fig. 1 is:

$$M.I. = \frac{2G + D}{3B}$$

in which G, D, and B are the prices (dollars per barrel) of regular gasoline, distillate and Bunker C fuel oil. Prices corresponding to the circle points on Fig. 1 were for Gulf Coast cargoes (dollars per barrel).

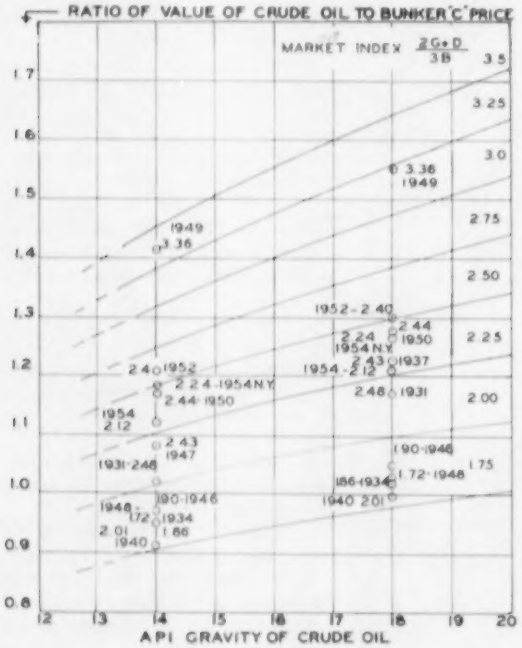


Fig. 1 — Values of crude oils relative to the price of bunker C fuel oil — Gulf Coast prices (except one point for New York).

	Gasoline	Distillate (or diesel fuel)	Bunker C	Market index
June 22, 1931*	$1.52	$1.05	$0.55	$2.48
Year 1931	1.96	1.10	0.55	3.04
June 25, 1934*	1.89	1.47	0.94	1.86
Year 1934	2.16	1.56	0.90	2.16
June 28, 1937*	2.62	1.68	0.95	2.43
Year 1937	2.63	1.76	0.91	2.56
June 24, 1940*	1.73	1.37	0.80	2.01
Year 1940	2.04	1.56	0.88	2.14
June 24, 1946*	2.42	1.89	1.18	1.90
Year 1946	2.55	1.92	1.24	1.88
June 28, 1948*	4.61	3.46	2.46	1.72
Year 1948	4.49	3.87	2.86	1.50
April 18, 1949*	4.61	3.00	1.25	3.36
Year 1949	4.35	3.13	1.55	2.54
March 3, 1950*	4.02	2.94	1.50	2.44
Year 1950	4.60	3.18	1.75	2.36
Year 1952*	4.72	3.39	1.75	2.44
June 23, 1954*	4.20	3.36	1.85	2.12
June 23, 1954 (N. Y.)*	5.65	3.86	2.25	2.24

*Shown on Fig. 1.

DRY INSTRUMENT AIR—5

Analyzing Dryer Design and Performance

by R. L. Dockendorff

IN Installment 4, discussion was begun on dryer design. An example was given with desired dried-air quality of 0.0007 lb. of water per pound of bone-dry air. This corresponds to an atmospheric dew point of 0° F.

Now, on Fig. 7, locate this condition. This diagram shows the vapor pressure of water over an activated alumina containing various amounts of adsorbed water, with an additional parameter of temperature. The data upon which this diagram is based may be obtained from the manufacturer of a particular desiccant.

Data of this sort on a silica-gel preparation are reported by Taylor[7] and by Perry.[8] Air (or certain other fluids) with a given temperature and water-vapor partial pressure will equilibrate with desiccant at a unique removable (adsorbed) water content.

The Drying Cycle

A reasonably obtainable summertime dry-air temperature is 100° F., so we start at this condition. To do so the desiccant must have been regenerated to a water content of 1.70 lb. water per 100 lb. of alumina. Suppose the compressed air at 100 psig. has been cooled to 95° F.; its water vapor pressure will be 1.66 in. Hg. Then, as this air flows through the dryer, it saturates the first alumina it meets to an extent indicated by Condition 2.

The use of cooling water in internal coils prevents the heat of adsorption raising the temperature above 100° F. Farther along, being partly dried, it now saturates the alumina to a value between Conditions 1 and 2. Finally, at the dryer outlet, it is nearly dry so it adds very little water to the alumina and it leaves substantially at Condition 1.

Breakthrough . . . As time goes on, the alumina at the inlet and progressing through the bed becomes completely saturated at the wet-air condition, and the water removal is occurring deeper and deeper in the bed. Eventually, the wet zone extends to the outlet, and rather abruptly the water content of the dried air rises. This condition is known as the breakthrough.

In practice, the drying cycle must not be continued at this point, for additional capacity so gained is small and considerable harm may be done by it.

Fig. 8 gives a series of curves representing the water content within a hypothetical bed at various times during the drying cycle. Crossplotting the intercepts at bed outlet of time vs. moisture content of the leaving air gives Fig. 9. Note the breakthrough.

Fig. 8 also makes apparent another important factor in dryer-bed shaping. Even under conditions where water adsorption is practically instantaneous—and this is hardly the actual case—the time lines slope slightly away from the vertical as required by material balance. For the actual case, with some lagging of the system behind equilibrium, the deviation from the vertical becomes greater.

Bed shape . . . However, a long narrow bed tends to have a capacity advantage over a short fat bed containing the same amount of desiccant because at higher velocities the slope of the curve is not much less steep and the opportunity for channeling is reduced. These phenomena are discussed by Eagleton and Bliss,[5] by Hougen and Watson,[11] and by Jury and Licht,[6] and are further commented upon below.

Cooling . . . A certain amount of heat is released during adsorption of water on the alumina. It is practical to continuously cool the bed with cooling water in

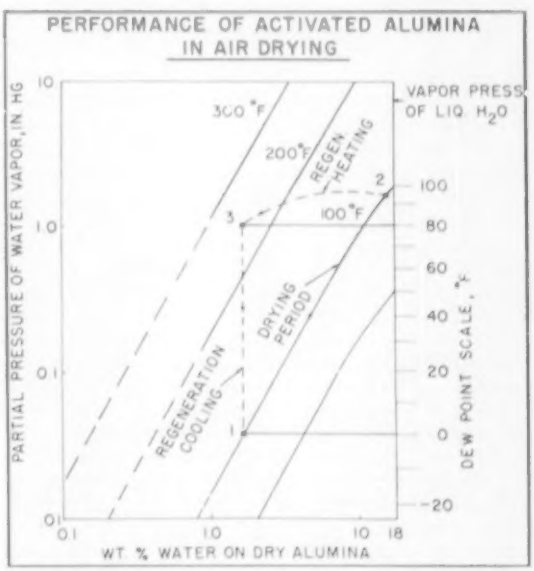


FIG. 7.

Author is with the engineering division, Humble Oil & Refining Co. at Baytown, Tex. Paper presented at Texas A. & M. process instrumentation symposium at College Station, Tex., January 25-28, 1955.

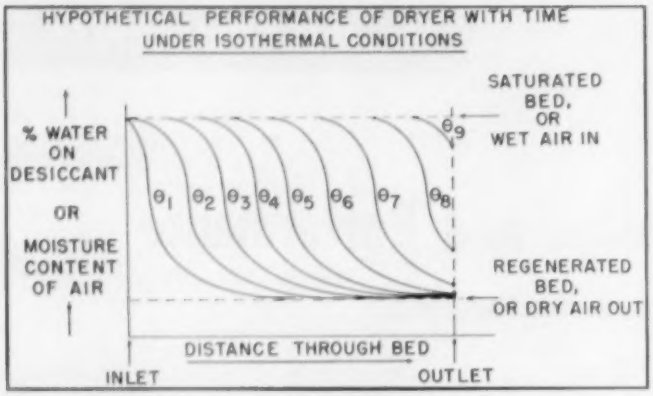


FIG. 8.

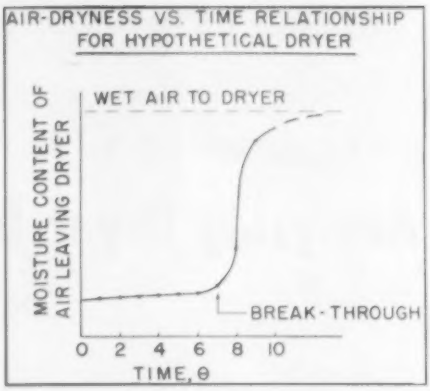


FIG. 9.

internal coils. In this way the bed may be kept at 100° F. during the drying cycle despite a heat release of about 1,100 B.t.u. per lb. of water adsorbed. Experiments reported by Dorr[10] show that when drying air is water-saturated at 72° F. and atmospheric pressure with activated alumina under adiabatic conditions (i.e., no bed cooling), temperatures within the bed in the range of 200° to 250° F. may be experienced. As time goes on, the outlet of the bed approaches this temperature, and the dryness of the leaving air is correspondingly affected. Holding a minimum temperature contributes to obtaining minimum dry-air moisture content. This is apparent in Fig. 7.

The Regeneration Cycle

Activated alumina adsorbs water in a reversible way. Its drying powers can be restored by heating and carrying off the water in a purge-gas stream. When a bed has approached the breakthrough point, its condition throughout will approximate Condition 2 on Fig. 7. The bed is removed from drying service and its pressure equalized to atmosphere. A stream of purge air is directed through the bed and vented to atmosphere. This can be a relatively small stream of dry air from an adjacent dry unit, or it can be supplied from the atmosphere by a blower. (For very high dryness it may be profitable, after the bulk of the water has been removed, to pull a vacuum on the bed for an hour while heating is continued. The potential benefits of this may be deduced from the figure.)

Heat is applied in one or more of several ways: internal steam coils, internal electrical-heating elements, or sensible heat added from a relatively larger stream of purge air, to name a few. In the case of the use of ambient air as a purge gas, for example, the heating might be carried on until the bed temperature approaches 250° F., and Condition 3, Fig. 7, is reached by a path possibly like the one shown. Note that in so doing the alumina water content is restored to the initial value, the water having left in the purge air.

It is usually recommended that the desorption conditions be maintained for about an hour after maximum temperature is reached. The benefits from this would be negligible in an ideal bed. But there are some indications that plant-scale dryers may best have their heating periods extended somewhat.

Next it is desirable to pass very dry air (such as would be obtainable from an adjacent drying unit) through the bed until it is thoroughly displaced, and then to cool the bed close to the process drying temperature of about 100° F. Embedded water coils do this job very well, particularly for a short cycle where time is limited. Otherwise, it is often the practice to provide for atmospheric cooling only. The cooling step is represented in Fig. 7 by a return from 3 to 1 along the indicated path.

New bed . . . Fig. 7 represents the performance of a new bed containing a typical grade of activated alumina. The figure predicts that it should be possible to get adequate water removal at a very moderate temperature of regeneration heating, say 125° to 150° F., provided the purge air be quite dry.

With use, however, there appears to be a progressive deterioration of the alumina. This occurs through crystal transformation to a less active form having less adsorbent surface than that it no longer behaves like Fig. 7, unless the regeneration temperature is 350° F. or more at least occasionally.[9]

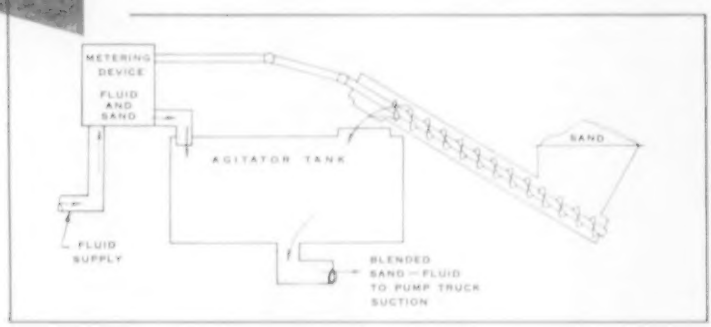
In some cases requiring extremely high dryness, the regeneration must be carried to above 370° F., no matter how dry the purge gas or how high a vacuum may be pulled on the system. Campbell, Skinner, and Lawrence[4] attribute progressive loss in capacity to formation of the stable and inactive alpha monohydrate of alumina. Activated bauxites, perhaps by virtue of their impurities, tend to retain their drying capacity better than does the purer activated alumina. Certain contaminants in the inlet air, such as lube oil from the compressors, will be held rather firmly by the alumina, reducing its capacity to adsorb water.

References

4. Campbell, Skinner, and Lawrence, Pet. Ref. 31-10, 106 (1952).
5. Eagleton and Bliss, C.E.P. 49, 543 (1953).
6. Jury and Licht, C.E.P. 48, 102 (1952).
7. Taylor, R. K., I.E.C. 37, 649 (1945).
8. Chem. Eng. Handbook, J. H. Perry 3rd edition, pp. 880-912.
9. Private Communication, Aluminum Co. of America.
10. Dorr, R. B., I.E.C. 30, 384 (1938).
11. Hougen and Watson, C.E.P. 43, 197 (1947).

CUTS COSTS ON BIG FRAC JOBS

HALLIBURTON'S *successful* SANDOIL FRACTURING



Big frac—the high volume Sandoil fracturing treatment—became economically practical with Halliburton's development of powerful pumping systems and continuous mixing equipment. Today, 40,000 and 60,000 gallon jobs that use low cost, widely available crudes or refined oils are successfully boosting production to new highs—*and at lower costs.*

Lease crudes were early recognized as the most economical carrying medium, but their low viscosities could not always prevent sand from settling out before entering the formation. This old hazard has been practically eliminated with faster, more powerful pumpers and Halliburton's exclusive Sand Proportioner which gives precise control of sand ratios and injection rates during the fracturing job. With this improved control, problem wells can now be successfully treated.

A proved record of production increases—averaging 175% additional oil from three-fourths of the wells treated—and 50,000 job experience has made Halliburton *first* in formation fracturing. In every field, modern equipment and experienced crews are ready to help you with more effective fracturing at lower costs. For a report on Sandoil success in your area or for a free copy of the new bulletin, "Rx for Production Improvement Techniques" which describes the new fracturing equipment, call your local or district office of the Halliburton Oil Well Cementing Company.

HALLIBURTON

FRACTURING SERVICES

211 SERVICE CENTERS—JUST MINUTES AWAY FROM ANY RIG

HOW WOULD YOU WRITE THIS AD?

Suppose suddenly methods and techniques had developed from the pioneering of certain tools that for the first time allowed startling and beneficial results to accumulate in relation to certain production problems. Just how would you adequately tell the next fellow about it?

The all-important point to put over would be to relate the fact that through the use of *ODDCO tools, including strong flexible drill collars, special whipstocks, mills, etc., *casing or liners of any grade may be milled through in a matter of hours rather than days.* As an example: 7", J-55 or H-40 pipe, 25 to 60 minutes; N-80, 2½ to 8 hours as an average.

This would mean then that for the *first time* remedial redrills could be accomplished economically and make possible remedial workovers in areas of low pressure, low permeability, fractured limestone or shales, tight sands, fault plays, etc.

In writing this ad it would be well to relate that certain reservoir research and proven practical knowledge dictate that, for instance, in many areas older wells can be considered damaged by the clogging in or near the original vertical collective bore. As a remedial measure it naturally would be desired to drill a new production hole in virgin territory, getting away as far as possible from the damaged area.

Until now this redrill would require starting deviating a considerable distance above the production zone, resulting in either very expensive pulling, cutting or milling work, probably new water strings, new C. P. jobs, costly rig time, etc., often not an economical expenditure in relation to increasing production and flattening out decline curves. Result — additional oil remains in the ground, and secondary recovery is entirely by-passed.

During the last year, *ODDCO has developed these combinations of tools whereas redrills may start below the shoe, or through the casing at the very top of the production zone, rapidly mill through and drill a "Hi-Angle" new production hole on an angle of 20, 30, 40 up to 90°, with reasonably controlled directional drilling, which holes may be surveyed, logged and lined if required.

Workover and/or production rigs may be used if equipped properly for this work, and good 2½" upset tubing may adequately be used for the drilling string. Then, this low cost equipment, coupled with the efficiency and low cost service of *ODDCO tools, may now for the first time make possible economical remedial redrills to accomplish secondary recovery.

If you were to write this ad, how would you put over the idea that inquiries to our engineers undoubtedly could astound you as to its possibilities in relation to your benefit?

Sievers Company, 2499 Cerritos Ave., Long Beach, California, is the exclusive domestic distributor of ODDCO Drainholes, and, in turn, has licensed the following in their respective territories. In areas not listed below, please contact Sievers Company, at the above address:

Permian Basin, Texas, Louisiana, Mississippi, Alabama and Arkansas

PETROLEUM DRAINHOLES DRILLING CORP.
1404 City National Bank Bldg. • Phone Atwood 7-417 • Houston, Tex
Heyman Oil Center • Phone LaFayette 8-3591 • LaFayette, La.
Box 3371 • Phone 6-7841 • Shreveport, La.

Kansas

HI-ANGLE DRAINHOLE DRILLING OF KANSAS
723 South Broadway • Phone Amherst 5-0496 • Wichita, Kan.

Texas Panhandle

HI-ANGLE DRAINHOLE DRILLING OF TEXAS PANHANDLE
c/o Boman-Chase Co., Stinnett Hwy. • Phone 83 • Borger, Tex.
1422 Tyler St., Room 8-2 • Phone Drake 2-2602 • Amarillo, Tex.

Oklahoma

HI-ANGLE DRAINHOLE DRILLING OF OKLAHOMA
1349 1st National Bldg. • Phone Regent 6-4471 • Oklahoma City, Okla.

California and Nevada

***OILWELL DRAINHOLE DRILLING CO.**
2470 Lemon Ave. • Phone Long Beach 40-8577 • Long Beach, Calif.

CALIFORNIA PRODUCTION SERVICE, INC.
3252 Cherry Ave. • Phones Long Beach 4-8147 or Nevada 6-2698 and Nevada 6-2716 • Long Beach 7, Calif.
2515 N. Ventura Ave., Box 258 • Phones Miller 3-8219 or Miller 3-8135 Ventura, Calif.
Highway 126 • Phones Newhall 320 or 955 • Castaic Junction, Calif.
3551 Pierce Rd. • Phones Fairview 3-2332 or 7-8606 • Bakersfield, Calif.

SAFETY AND THE DRILLER—1

Is Safety Essential to Efficient Drilling?

THE series that begins with this article does not try to tell you how to manage your rig. Let's have that understood right at the start.

You are in charge — because the firm recognized your ability not only as a skilled worker, but also as a driller and a leader of men. You earned your place. The fact that you continue to hold it shows that this confidence in you is justified.

This message comes to you because you are a leader. It discusses something in which your firm is very much interested . . . something it wants very much to see succeed . . . and something it knows cannot succeed without you.

These articles have to do with safety and accident prevention.

Waste affects your future . . . To begin with, anything which hurts your firm hurts you and everyone else connected with it. Your progress depends upon the firm's progress. Suppose the firm is called upon through preventable accidents to pay out money unnecessarily. Then, just that much is subtracted from the firm's ability to give steady employment at fair wages, and to make improvements in working conditions, or to carry out plans for expansion. All these things are of direct concern to you. Isn't that a fact?

In the second place, anything that reduces the quality and quantity of results on your rig hurts your showing as a driller. The same is true of anything that adds to your operating costs. Accidents not only deprive you of the services of good men, but they also put you under the handicap of having to get along with "green" workers. And you know how much a green man slows up a rig.

What is a good driller? . . . Someone has said, "A good driller is one who takes the men, material, and equipment on a rig and gets out of them the best production at the least possible cost."

Here is another answer: "He is the man who tells the crew what to do and how to do it. And then he sees that it is done properly." You can probably think of a lot of other answers to this question. Now, what qualifications must a man have to make a good driller?

Let's list a few: Knowledge of the job; common sense; initiative; ability to give instructions clearly; ability to give proper supervision; leadership; loyalty; willingness to set a good example; willingness to accept responsibility; sincerity; and reliability.

Many of these qualifications for a good driller need no explanation. But let's take one and analyze it to see just what it means. Accepting responsibility, for instance. Isn't it a fact that the driller must accept the responsibility for everything done by his men—for everything that is done on the rig and to the equipment of the rig?

Know this problem? . . . Have you as driller ever gone to a lot of trouble to explain to one of your men just how he should do a certain job—then had him fall down through thoughtlessness or failure to follow instructions? Maybe the result was a damaged piece of equipment that caused you to shut down the rig for an hour or two for repair.

You probably felt like throwing all the blame onto him. But when the tool pusher asked you for an explanation, you couldn't altogether get away from the fact that you were partly to blame. You had given your man the proper instructions—but what about the follow up? Didn't you admit—or didn't the tool pusher explain that you fell down on supervision?

Suppose the case had been so bad that you had a bad fishing job. The well wasn't finished on schedule and your firm lost all future drilling contracts for that particular company. What would the drilling superintendent have said to the drilling contractor? He couldn't say, "I'm sorry gentlemen, but I am not to blame. That order was lost because one of my drillers let a worker kick a piece of junk in the hole."

Every drilling superintendent knows that he is responsible for results no matter what difficulties may be encountered. Among other things, he is paid to carry that responsibility. Likewise, part of your salary as a driller is paid to you for carrying your share of that responsibility.

An overworked tool pusher, who was looking after three rigs, once said to a trusted driller, "Go ahead, Brown, rig up for the new job and get ready to start making hole." A big responsibility? Yes! But what happened? Brown wanted to know when to start, where to get a crew, where to set the boilers, how to dig the mud pits, where to put the light plant. He complained that he would have to neglect other work if he did this job. And in fact, he placed the entire burden of responsibility right back on the tool pusher who was obliged to supervise the job himself. The work was done, of course. All the trivial questions and objections raised by Brown were ironed out. But not by him—by the tool pusher.

But what has all this to do with accident prevention?

Just this: The same qualifications that go to make a good driller from the production standpoint apply with equal importance in the makeup of a good driller from the safety standpoint. The very things that the good driller does to get production are the same things he must do to prevent accidents. It can truly be said, "Show me the driller whose production record is satisfactory, and I'll gamble his safety record is equally good." Also, "Show me a driller with a bad accident record, and I know that his production record is just about as bad."

The material for this series is from the A.A.O.D.C.'s "Safety and the Driller." It was prepared by the National Safety Council and adopted by the Insurance and Safety Committee of the American Association of Oilwell Drilling Contractors.

WIGGINS DOUBLE PONTOON FLOATING ROOFS

Safest Storage for Your "Liquid Assets"

Performance records prove that Wiggins Double Pontoon Floating Roofs soon pay for themselves in liquid conserved. Only Wiggins Double Pontoon Floating Roofs have every important feature for maximum conservation . . . safest operation . . . low-cost maintenance.

Triple Seal increases conservation savings and adds extra safety.

Multiple gas-tight pontoon compartments increase safety, strength and buoyancy.

Simplified design gives strength with minimum trussing, making inspection and maintenance easy.

Complete, clean drainage reduces corrosion problems.

Get the full story on the General American-Wiggins system of petroleum liquid conservation by writing us on your letterhead for the new Wiggins Manual WP-14.

Wiggins Double Pontoon Floating Roofs, Dry Seal Gasholders, Lifter Roofs, Cone Roofs

GENERAL AMERICAN TRANSPORTATION CORPORATION

135 SOUTH LA SALLE STREET · CHICAGO 90, ILLINOIS

PIPELINE PATROL

Here's what you can expect from . . .

Radiographic Weld Inspection

Radiographic inspection can be extremely helpful in getting good welding on a pipeline job. But emphasis must be on quality rather than quantity of work done. This article tells how to get that quality.

by W. W. Thayer

PIPELINE companies planning use of a radiographic weld-control service should expect and demand high-quality service. It should be dependable and furnish all benefits possible from such a service.

A great many benefits are derived from a dependable radiographic weld-control service for pipeline and plant construction. Probably its outstanding feature, other than being a nondestructive testing method, is its tendency to prevent rapid declines in welding quality.

Radiographic field reports have been studied over a period of several years, and a definite rise and fall pattern in welding quality has been noted. This fluctuation appears on all jobs and tends to run in cycles of 2 to 4 weeks. Qualified radiologists are aware of these changes and are always on the alert for clues known to be forerunners of quality decline. At the appearance of these clues, the weld inspector is immediately informed. Forewarned, he can prevent an unfavorable situation from arising.

Stringer is worst offender . . . The prevention of quality decline in pipeline welding is not magic, but common sense. Over 90 per cent of the defects are located in or adjacent to the stringer bead. Welding of the stringer usually involves only two welders. But it affects practically all the welds made.

Stringer defects appearing repeatedly on the radiographs tend to gradually get worse unless the weld inspector is told about them promptly. He can quickly inform the line-up foreman or the stringer welders and the condition can be corrected before it becomes critical. Normally, welders are anxious for this information. They are working at maximum speed but still are interested in maintaining high-quality work. Speed and cooperation by all those concerned are the essence of this preventive function because welding quality can drop in a day's time.

A second major benefit is the pyschological effect on the welders of having a radiographic service present. It tends to influence the welders to put forth more effort in producing top-quality welds. It also induces the welders to stay honest. They know some of their welds will be radiographed but do not know which ones. Most pipeline welders, if given the opportunity, will gladly improve their techniques when they are shown to be faulty.

The actual radiographic inspection of the welds is, of course, the basic purpose of this service. This produces negatives which furnish visible evidence as to the quality of the subsurface areas of the welds. If the negatives show void defects in the welds, then such defects are present. But this operation will not indicate granular changes or laminated conditions in the pipe metal.

Another important benefit this service furnishes is another opinion on welding quality. This is an objective opinion based on knowledge and facts, without the influence of personal interests.

Quality service demanded . . . The benefits derived from a radiographic weld-control service depends upon the quality of the service. The quality in turn is based on a multitude of factors and operations. Each factor or operation is dependent upon the others. And the absence of any one of these will have an unfavorable effect upon the benefits derived from the service.

Integrity and experience on the part of those furnishing this type service are necessary factors. Users must firmly believe that the services offered will be beneficial and advantageous to pipeline construction. Without such a belief, the service will be of inferior quality.

Experience based on technical knowledge and practical training is vital to furnishing a high-quality radiographic

Author is manager of Thayer X-Ray Service, Tulsa.

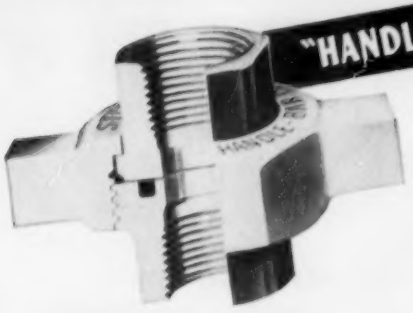
An OIL BANK . . .
directed by OIL MEN . . .
in the OIL CAPITAL of the World!
Think 1st of Tulsa
OUR 40th YEAR
FIRST NATIONAL BANK & TRUST CO.
Member Federal Deposit Ins. Corp.

Write or Wire for Monthly Stock Lists
● VALVES
● PRESSURE TUBING
● STEEL
Peerless Supply Co., Inc.
L. D. 75 & 76 P. O. Drawer 36-A
Shreveport, La.

NO PIPELINE JOB TOO TOUGH FOR OUR EXPERIENCED ORGANIZATION.
RAY L. SMITH & SON, INC.
ELDORADO, KANSAS
SINCE 1926

America's Finest

"HANDLE-BAR" O RING



Unions

are drop forged from highest quality forging bars. Accurately machined and finished to precision dimensions. Rigidly inspected throughout production and air tested under oil after completion to meet the highest standards of quality.

PERMANENTLY LUBRICATED NUT THREADS for quick and easy make and break. EXTRA HEAVY HANDLE BAR NUTS to withstand rugged use. "O" RINGS FORM PERFECT SEAL to retain pressures. "O" RINGS will not fall out. SEPARATE "O" RINGS are available for services and temperatures up to 500°F.

WHY NOT WRITE for complete information on these and other Unions fully described and illustrated in our NEW CATALOG

Clayton Mark & Company

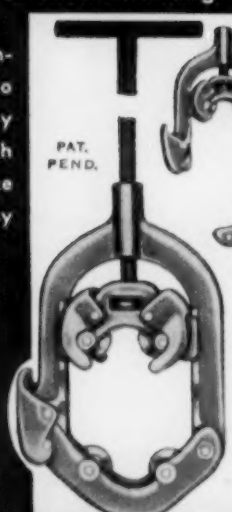
1900 DEMPSTER STREET · EVANSTON, ILLINOIS · U.S.A.

IF YOU CUT LARGE DIAMETER PIPE . . . YOU NEED THESE

New REED HINGED 4-WHEEL PIPE CUTTERS

Four sizes cover the range from 2½" to 12"

Users tell us these completely new cutters are so efficient they often "pay for themselves" through the savings in crew time on a half-dozen cuts. They are the first really practical tools for cutting off steel or cast iron pipe in sizes from 2½" to 12". You can, for example, cut 8" steel pipe completely off in less than five minutes.



Four wheel design requires minimum swing of handle—less digging in ditch work, easier "tight-corner" cuts.

Closed frame permits light weight with complete rigidity for better cutting.

4-point guide aligns the cutter on the pipe . . . assures perfect tracking and a right angle cut.

Reed Razor Blade wheels track perfectly, cut easily and roll down burr on steel pipe.

Unconditionally guaranteed to be the most efficient cutter you have ever used. Ask your jobber or write for literature.

REED MANUFACTURING COMPANY

ERIE, PENNSYLVANIA · U. S. A.

Pipeline Patrol

service. Those furnishing such a service must be aware of its limitations and capabilities. They must have practical knowledge so as to furnish the proper equipment and tools to cope with pipeline conditions. Lack of these basic factors might well result in promises of too much for too little, which in turn will produce a stinted and low-quality service.

Radiographic technicians should be familiar with pipeline construction and should have radiographic experience under the various conditions normally met. They must be dependable, diplomatic, and know the basic principles of radiography. Radiographers should have at least 1 year of actual experience before being permitted to operate a radiographic unit. This experience must be obtained under the direct supervision of a qualified radiologist.

A year is no more than time enough to become familiar with the tools and general techniques used in obtaining and producing graphs of pipeline welds. There are no short cuts for becoming accurate at interpreting negatives of pipeline welds. Although aid from a qualified radiologist is helpful, experience is the best teacher. A trained radiologist will report what he sees in the negative, but an inexperienced operator may be influenced by pressure or other opinions.

Because only a percentage of welds are radiographed, pipeline radiography is normally more of a weld control than an inspection agency. Yet the quality of the subsurface areas of all the welds is largely determined from the few welds that are radiographically inspected. This places a great deal of responsibility on the interpretation of each radiograph. Therefore, only those fully qualified should attempt to read and report these graphs.

The general attitude of the radiographer to this work and to those involved in the welding is a factor not to be overlooked. Basically, his function is to furnish the weld inspector with immediate weld information from the radiographs he has obtained. He should be, however, capable of assisting with welding problems if the occasion arises. His cooperation with the inspection is absolutely essential. So is his loyalty to the pipeline company.

Quality, not quantity . . . Probably the major factor responsible for low-quality radiographing is the trend toward inspection of more and more welds per day. This is usually done at prevailing prices and hence, results in a stinted service. The income will not permit a helper or the necessary supplies needed for a good service. An operator caught

DOW

announcing
GALVOMAG
Dow's new high potential anode cuts cost of corrosion protection

4 new GALVOMAG anodes do the job of 5 conventional anodes . . . to reduce your original investment and installation cost, too

Let's take a new look at cathodic protection. Dow's new high potential anode, called GALVOMAG*, has 25% more current output than conventional anodes.

To put it another way—4 anodes now do the work of 5. It's easy to see why your installation costs in time and labor will go down in proportion.

In addition, economical protection in high resistivity soils can now be achieved. GALVOMAG's greater current output extends its use into ranges previously impractical for magnesium anodes.

Your Dow anode distributor is ready with all the facts and figures on GALVOMAG. Call him today. THE DOW CHEMICAL COMPANY, Midland, Michigan. *Trademark

DISTRIBUTORS: ANTI-CORROSION MFG. CO., Atlanta, Georgia • CATHODIC PROTECTION SERVICE, Houston, Texas • CORROSION SERVICES INCORPORATED, Tulsa, Oklahoma ELECTRO-RUSTPROOFING CORP., Belleville, N.J. • ROYSTON LABORATORIES, INC., Blawnox, Pa. • STUART STEEL PROTECTION CORP., Kenilworth, N.J. • THE VANODE CO., Pasadena, California.

you can depend on DOW MAGNESIUM ANODES DOW

Now... M. J. CROSE MFG. CO., INC.

IS YOUR NEW SOURCE OF SUPPLY FOR.

H&L Teeth
that really Dig!

Made of high alloy steel forgings and uniformly heat treated to insure toughness and provide resistance against abrasion and wear. Quick changing by using only hammer and punch . . . points stay sharp . . . will not rattle off . . . no reversing.

- LESS POWER
- LOWER COST
- LONGER LIFE
- GREATER YARDAGE

Warehouse stocks carried in the following locations:
M. J. Crose Mfg. Co., Inc.—Tulsa, Oklahoma
Crose Pipeline Equipment Co.—Newark, N. J.
Crose-Curran Ltd.—
Edmonton, Alberta, Canada
Orders promptly handled through:
Pipeline Supply Co.—Houston, Texas
M. J. Crose Mfg. Co., Inc.—Denver, Colorado

m.j. Crose
MANUFACTURING COMPANY, INC.
SPECIALIZED EQUIPMENT FOR THE PIPELINE INDUSTRY
2715 DAWSON ROAD • PHONE 6-2172 • TULSA, OKLAHOMA

WHAT ASBESTOS PIPE LINE FELT DO YOU NEED?

- NICOLET 15# ASBESTOS PIPE LINE FELT.
- NICOLET 15# PERFORATED ASBESTOS PIPE LINE FELT.
- NICOLET TUFBESTOS.

If these standard products do not meet your specifications we will be pleased to work with your engineers to help solve your problem.

The Felt With a Future

MANUFACTURED BY:
NICOLET INDUSTRIES, INC.

70 PINE STREET
NEW YORK 5, N. Y.

in this situation will concentrate on meeting his quantity obligations at the expense of quality.

The psychological effect of a radiographic weld-control service on the welders is governed by the quality of the service. The welders are probably the first to become aware of an inefficient service and will react accordingly. They will also be the first to be aware of an accurate and dependable service, and will be inclined to take advantage of the chance to improve their welding.

Given the privilege of viewing graphs of their own work, welders will note and correct any faulty techniques they may have unknowingly adopted. Under these circumstances, the welders will be more frank and cooperative with the inspection.

In most instances it is less expensive and easier to encourage a good welder to do better work than to replace him with a welder of unknown qualities.

Furnishing the weld inspector with immediate information concerning any drop in welding quality is exceedingly important. On many cross-country pipeline projects, radiographic weld information would be of no value if delayed for even 4 hours. In that length of time many welds with faulty stringer passes probably would be wrapped and in the ditch.

As previously stated, the prompt furnishing of weld information to the inspector is the essence of a radiographic weld-control service. Also, the use of it as an aid instead of a weapon for controlling welding quality is a feature worthy of consideration.

Field techniques . . . The efficiency of a radiographic weld-control service depends a great deal on the techniques applied. Some of these are not essential but still add much to the quality of the service.

Penetrameters,* for instance are valuable keys to the sensitivity of the radiographs. They should be used on each exposure. They provide the weld inspector with visible evidence of good-quality graphs and indicate the extent of whatever defects are present. Radiographers can determine the sensitivity of graphs by noting the definition of defects, densities, and cover-pass beads or ripples. However, penetrameters are very valuable in obtaining good-quality radiographs.

Weld standards or specifications are necessary to a good radiographic weld-control service as a quality guide for reading and reporting graphs. The lim-

*Penetrameters, for pipeline radiography, are leaves of steel 1½ in. long by ½ in. wide and are 2 per cent of the thickness of the pipe wall. The penetrameters have perforations ½ in. apart (not to exceed 3/32 in. in diameter). Lead numbers are attached to one end of the penetrameter to identify its thickness.

Another type is the step penetrameter. It is 2 in. long by ½ in. wide and graduates from 0.005 to 0.020 in. in thickness at ½ in. intervals. These have perforations (not over 3/32-in. in diameter) at each change of thickness. Step penetrameters are very popular because they accommodate pipe walls from ¼ to 1 in. in thickness.

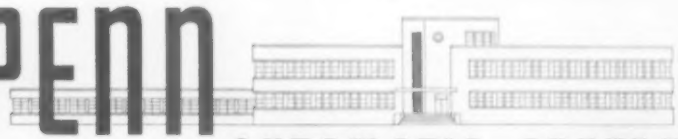
"I don't care what you heard . . . that oil is only moving 4 miles an hour!"

"BLOW THE WHISTLE"

to prevent engine damage

Before little troubles grow into big, expensive repair jobs — you can detect them with a Penn Engine Safety Control. At the first hint of overheated cooling water or lube oil failure, the Penn Control *automatically* sounds an alarm, flashes a warning light or stops engine operation — whichever you choose. Then you can discover and correct the engine trouble before it gets big and costly. Let us send you the complete story on this low-cost insurance for your engines . . . write **Penn Controls, Inc., Goshen, Indiana.**

PENN



AUTOMATIC CONTROLS

FOR HEATING, REFRIGERATION, AIR CONDITIONING, GAS APPLIANCES, PUMPS, AIR COMPRESSORS, ENGINES

itations may vary with the pipeline company's needs, but some type should be adopted as a guide.

Normally the welds to be radiographed are chosen by the radiographer. Nevertheless, he must be certain to radiograph some of the welds made by each welder daily. He must also radiograph those welds indicated by the inspector as being of doubtful quality. Welders whose work is not up to standard should have their work inspected more often.

Radiographing with the source and film outside the pipe is common practice. Those using gamma-ray sources can radiograph two-thirds of a girth weld with one exposure. The remaining one-third is usually not inspected radiographically. Many pipeline companies prefer this because twice as many welds and at least 20 per cent more feet of welding may be inspected daily.

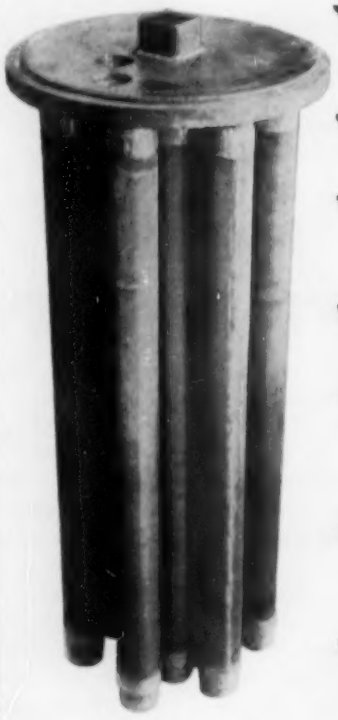
Another technique necessary to a quality service is accurate identification of welds. All film necessary for one weld should have the same identifying number. A corresponding number should be stenciled on the weld or on the pipe adjacent to the weld. This will give a permanent mark for reference should need arise.

Locating defects from their respective radiographs by their position in the weld is also important. This can be done with a number belt which is placed completely around the pipe beside the weld and opposite the exposure numbers. The lead numbers attached to the belt should be spaced 5 to 10 in. apart. They are read clockwise and in order when looking in the same direction as the pipeline construction is progressing. The zero position of the number belt is at the top center of the pipe. The images of these lead numbers appear on the negatives. By noting the position of the defect in relation to the image of the belt numbers, the defect can readily be located as to its position in the weld.

Paper work . . . Field reports should be made out daily in quadruplicate. The pipeline company's main office and the welding inspector should each receive a copy of this report daily. A third copy should accompany the negatives which are given to the welding inspector in dated and labeled boxes or envelopes after they are completely processed. The fourth copy should be retained by the radiographic company.

The radiographs obtained of the welding are the material product of a radiographic weld-control service. These graphs furnish another permanent record, and as such should be of good quality, and free of scratches or processing stains.

New MOORLANE MULTI-TUBE
PIPE LINE STRAINER
for
PRODUCTS PIPE LINES
Filters dirt, pipe scale and heavier particles



MULTI-TUBE STRAINER ELEMENT

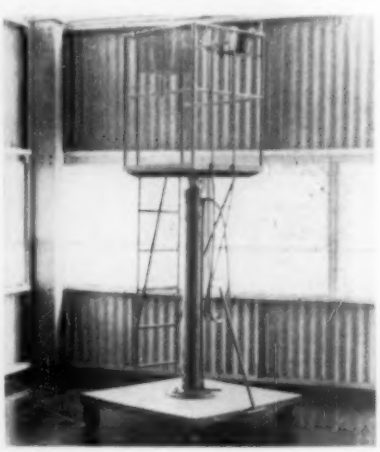
- Filter element can be cleaned *in the strainer* by backwashing.
- Cleaning operation takes less than five minutes.
- Capacity of unit more than twice conventional strainer of same size.
- Very low pressure drop during operation.
- On a barrel per dollar basis, the cost is much lower than conventional strainers.
- Can be designed to filter minimum particle size specified.
- Low maintenance cost due to simplified construction.

Prices and test data in Bulletin 454. Write for your copy . . . . . .

MOORLANE COMPANY
409 EAST ARCHER
TULSA 1, OKLAHOMA

Maintenance Aids . . .

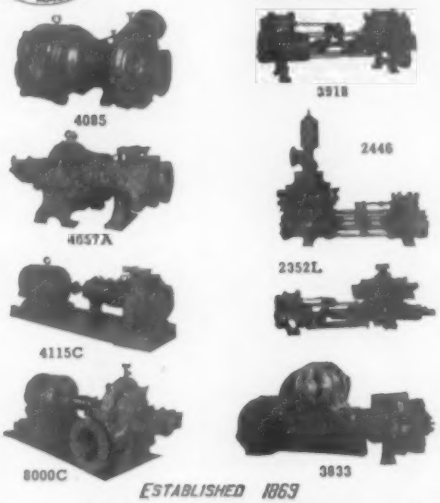
HERE'S an air hoist for reaching those high ceilings with ease and safety. It's in use by El Paso Natural Gas Co. at their El Paso station. Convenient air outlets on the platform allow connection of a paint spray gun or air-driven tools.



PUMPS

CENTRIFUGAL
RECIPROCATING

BUILDERS OF OUTSTANDING PUMPS
Since 1869



ESTABLISHED 1869

DEAN BROTHERS PUMPS INC.
INDIANAPOLIS IND.
323 W. TENTH ST.

KEEP PURE DRINKING WATER ALWAYS HANDY

insist on the highest quality

Gotkool
water cans and coolers

Specify **"GOTKOOL"** the next time you order water cans or coolers. **"GOTKOOL'S"** exclusive construction keeps water cooler . . . fresher . . . purer. Extra wide, snug-fitting, splash-proof top keeps out impurities. Non-leaking, push-button faucets, either extended or recessed flush-mounted. *Buy* **"GOTKOOL"** *at your supply store today.*

GOTKOOL Water Cooler — made in 2, 3, 5, 8, 10, 15, and 20-gallon sizes with extended or recessed flush-mounted faucet optional. *(Note: 15- and 20-gallon sizes available with extended faucet only.)*

GOTKOOL Water Can — made in 1½, 2, 3, 5, 10, and 20-gallon sizes without faucets. Extended or recessed flush-mounted faucets available at slight additional cost. *(Note: 15- and 20-gallon sizes available with extended faucet only.)*

Insist on the genuine — look for the *Blue and Black Label* with the name "GOTKOOL" in Red.

H. P. GOTT MFG. CO.
WINFIELD, KANSAS

FABRI-VALVE'S NEW DiFAB
WEDGE GATE VALVE

The modern valve for modern industry... engineered and fabricated by the latest in modern methods. This exceptionally light-weight DiFAB valve is adaptable to many difficult line applications where low cost and long, trouble-free operation is a necessity. DiFAB valves are available in 2" to 16" in the 150-lb. to 300-lb. series. Custom fabricated from stainless steel, monel, nickel, or any alloy combination, Fabri-DiFAB-Valves cost less, are cheaper to ship, install.

Write, Wire, Call for Information or Estimate

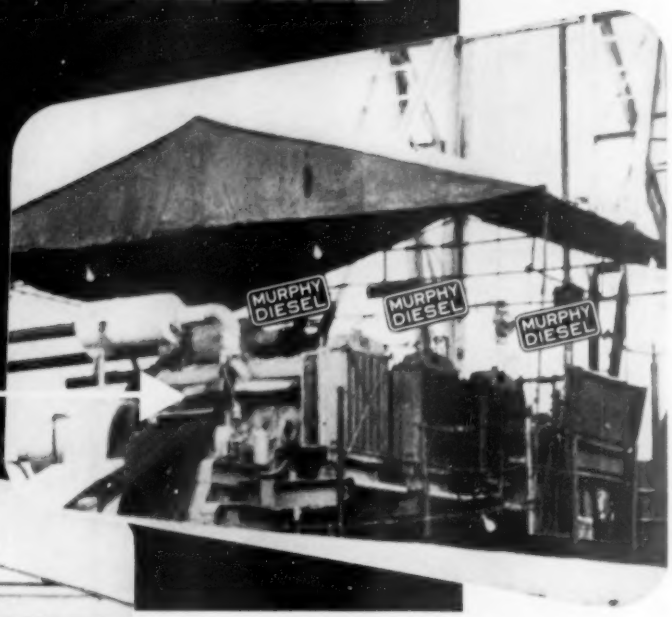
TRADE MARK
FABRI-VALVE
COMPANY OF AMERICA
2100 N. Albina Avenue, Portland 12, Oregon

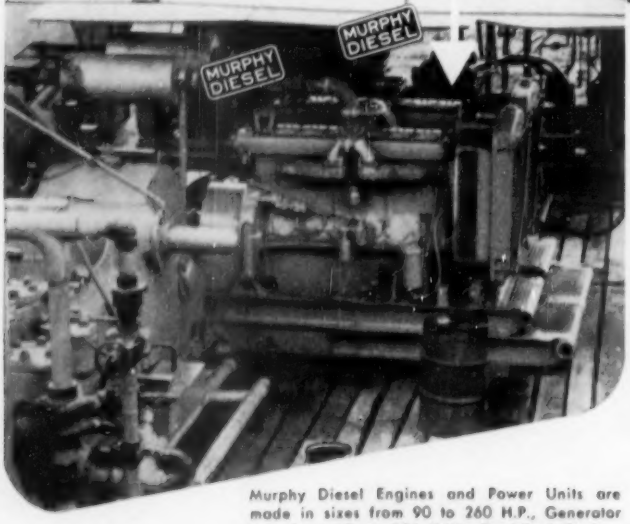
FABRI-VALVE DISTRIBUTORS

ALDREDGE & McCABE	Denver, Colorado
CORDES BROTHERS	Los Angeles, Calif.
FELKER BROTHERS	Marshfield, Wis.
THOS. W. MACKAY & SON, LTD.	Vancouver, B. C.
DOUGLAS ROBBINS CO.	Middletown, Ohio
SOUTHERN CORP.	Charleston, S. C.

5 MURPHY DIESELS

put real heavy-duty power into this Clegg and Hunt rig





Murphy Diesel Engines and Power Units are made in sizes from 90 to 260 H.P., Generator Sets from 60 to 154 K.W.; Dual-Fuel Engines from 135 to 215 H.P. Marine Propulsion Engines, 90 to 225 H.P.

It's Murphy Diesel power all the way on this rig owned by Clegg and Hunt, Houston, Texas. Three 210 H.P. Murphys power the drawworks and pump. Two 185 H.P. Murphys are also compounded to a pump. When these photos were made, the rig was operating just outside of Beaumont.

Using Murphy Diesel power all the way is the best way to get all the dependable, trouble-free service, freedom from costly downtime, and the fuel economy that make Murphy Diesels so popular in the oil country. All these profit-making advantages are the result of Murphy Diesel's exclusive combination of design features. Ask your Murphy Diesel Dealer to tell you the whole story and to show you how Murphy Diesels on your rig can make it possible for you to make more hole at lower cost.

MURPHY DIESEL COMPANY • 5305 W. Burnham St. • Milwaukee 14, Wisconsin

FACTORY BRANCH—Sales, Parts, and Service: 113-117 So. Elwood St., Tulsa, Oklahoma

803

MURPHY DIESEL

SEE YOUR MURPHY DIESEL DEALER, TODAY—

ALBUQUERQUE, NEW MEXICO, Lively Equipment Company; BUTTE, MONTANA, Hall-Perry Machinery Company; CORPUS CHRISTI, TEXAS, Houston Engine & Pump Company; DALLAS, TEXAS, Conley-Lott-Nichols Machinery Co.; DENVER, COLORADO, Power Equipment Company, EDMONTON, ALBERTA, CANADA, Northern Engine & Equipment Co., Ltd.; GREAT BEND, KANSAS, Manufacturers Dist. Co.; GREAT FALLS, MONTANA, Hall-Perry Machinery Company; HOUSTON, TEXAS, Houston Engine & Pump Co., Inc.; JACKSON, MICHIGAN, Utility & Industrial Supply Co., LOS ANGELES, CALIFORNIA, Industrial Engine Service; LUBBOCK, TEXAS, Conley-Lott-Nichols Machinery Co.; SAN ANTONIO, TEXAS, The Roy Klossner Company; BAKERSFIELD, CALIFORNIA, Glenn Rose Engine Service; ODESSA, TEXAS, Conley-Lott-Nichols Machinery Co.; LONGVIEW, TEXAS, Nichols Machinery Co.
TULSA, OKLAHOMA, SALES, PARTS AND SERVICE.

Among the

Drilling Contractors

Fortenberry Drilling Co., Natchez, Miss., will drill a 6,000-ft. Wilcox test in Jefferson County, Mississippi, for J. Paul Ratliff, Jr., of New Orleans. Location is in 59-9n-1w, at 1 Krauss, about 10 miles west of Fayette.

John S. Hagestad Drilling Co., Bakersfield, Calif., is drilling for Oceanic Oil Co. at a wildcat location near Fellows, in southwestern Kern County, California. Location is southwest of the C.W.O.D.B. area. It is at H-1-2 C.W. O.D., in 2-32-22. Contract objective is 3,500 ft.

U. S. Drilling Co., Los Angeles, is drilling on a new deep test in the Moorpark area, in southern Ventura County, California. It is a contract job for Robert S. Lytle, who proposes to carry the test, 2 Williams, in 33-3n-19w, at least to the 8,500-ft. depth of his first test, 1 Williams, abandoned last November.

R. L. Gibson Drilling Co., Kilgore, Tex., has a rig working for L. A. Grelling and others, of Tyler, Tex., at a wildcat location 2 miles southwest of Kamp, in Kaufman County, East Texas. The test is listed as 1 Watkins. Location, in the E. Higdon Survey, is 3 miles west of Ham Gossett field. It is a 4,800-ft. operation.

J. B. Swabbing Co. is contractor on a 4,000-ft. wildcat test R. W. Fair and Doug Procter, of Tyler, Tex., are undertaking 2 miles southeast of Arp, in Smith County, East Texas. Location is at 1 Ray, in the M. G. Herriquez Survey. It is about 3½ miles west of production in East Texas field.

Lamar Windham (left), tool pusher, and Steve Rowley, assistant to the president, H. L. Rowley, Inc., of Shreveport, on a rig the company is operating in Locust Ridge field, Tensas Parish, eastern Louisiana. The well, drilled to 9,120 ft., is testing sand at 9,030 ft.

Columbia Drilling Co., Houston, is keeping a rig busy in East White Lake field, Vermilion Parish, Coastal Louisiana, where it is drilling for Union Oil Co. of California. Newest operation drilling is 7-B Vermilion Parish School Board, a location east of production. It is scheduled for a depth of 8,500 ft.

Gackle Drilling Co., Inc., Fort Worth, is drilling for Amerada Petroleum Corp., at 1 Allred, a wildcat in 8-20-36, about 1½ miles west of production in Monument field, Lea County, southeastern New Mexico. It is a 4,000-ft. test.

Kern-Trimble Drilling Co., Magnolia, Ark., has a new contract operation under way in Flora field, north of Flora, in southwestern Madison County, Mississippi. It is the first drilling there in many months. Great Northern Oil & Gas Co., Inc., Jackson, Miss., is the operator. The test, 1 Bowering, Keyes & Childress, is projected to the field's Selma pay about 4,500 ft. The field has three wells producing 26°-gravity oil.

Sunnyland Contracting Co., Rayne, La., is under contract to Durbin Bond & Co., Inc., for a Lower Cretaceous test at a wildcat location 3 miles east of McHenry and about 9 miles southeast of Wiggins, in Stone County, southeastern Mississippi. Location is at 1 Dantzler, in 10-4s-11w. Objective is expected around 9,000 ft. Sunnyland also has a new Mississippi Wilcox test scheduled. It will be drilled for Gauthier & Heard and W. L. Billups at 1 Lanneaux, in 43-6n-3w, 2½ miles west of South LaGrange field, in Adams County.

H. L. Rowley, Inc., Shreveport, will drill a deep test for Cities Service Oil Co. in northwestern Greene County, southeastern Mississippi. The test, projected to the Lower Cretaceous-Glen Rose horizon with expected depth of around 13,000 ft., is located about 1½ miles west of the one-well Sand Hill

CUT *shop expense*

Cut shop expense on your drill collars by using 'Bestolife Lead Seal. Because of its high percentage of powdered metallic lead, 'Bestolife is heavy enough to stay on threads and shoulders instead of being squeezed out. This gives you extra tight leak-free joints, which are easy to break out. That's why 'Bestolife is first choice with tool pushers all over the world. See your local supply store for 'Bestolife. In 1¼, 5, 20 and 50 lb. cans. Unconditionally guaranteed.

I. H. GRANCELL

Operates Easier, Faster

MUDWONDER

NEW ROCKWELL BUILT MUD VALVE

Edward Valves, Inc.
Subsidiary of ROCKWELL MFG. CO.
1212 W. 145th STREET
EAST CHICAGO (phone 231)
INDIANA

TUBING GRIPPER

by Baird

To Handle Tubing safer . . . easier

- Applied to the collar and you can pusl or pull.
- Made of special aluminum alloy—it weighs less than two lbs.
- The rubber covered prong protects internal threads.

Always Available Through Your Supply Store

BAIRD MFG. CO.
P. O. Box 380 TULSA, OKLA.

INCREASE PRODUCTION

CLEAN OUT CHOKING SAND

Excessive sand and sediment holds back your oil. For fast, easy clean out with fewer round trips and less down-time, use world famous Miller Sand Pumps.

Write for descriptive price list.

PUMP & BAILER SIZES
O.D.—2½, 3, 3½, 4½, 5, 5½, 7 in.
Lengths—20, 25, 30 ft.

Composite Catalog Page 3433

MILLER SAND PUMP CO.
General Offices, Box 4516
Oklahoma City 9, Okla.
EXPORT OFFICES
30 Rockefeller Plaza
NEW YORK CITY 20, N. Y.

field, productive from the Upper Cretaceous-Tuscaloosa formation. Location is for 1 Reasor, in 8-4n-8w.

Eggleston Drilling Co. is contractor on a new 8,200-ft. wildcat operation Houston Oil Co. of Texas is undertaking in the Singer area, Beauregard Parish, southwestern Louisiana. Location is on Lutcher-Moore acreage, 2 miles east of Bivens. It is 1½ miles northwest of Singer production.

Crow Drilling Co., Shreveport, is drilling for I. P. LaRue, of Jackson, at a newly started wildcat test about 2 miles northwest of production at Bolton, in western Hinds County, Mississippi. Location is at 1 Gaddis, in 1-6n-3w. Scheduled depth is 11,200 ft. to provide a test of Lower Cretaceous sands productive at Bolton, a 1954 discovery.

Calvert Drilling Co. has a new wildcat operation under way in Logan County, northeast Colorado. It is a contract job for Cosden Petroleum Corp. at 1 Fehringer-Brown, in 29-9n-54w, a mile west of Arford.

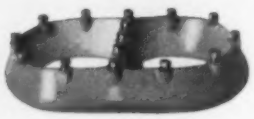
Stephens Production Co., Fort Smith, Ark., will drill another well for Murphey Corp., of El Dorado, Ark., in the Moreland area, northeast of Russellville, in Pope County, northwestern Arkansas. Location is slightly more than a mile southwest of Murphy's first test, which discovered gas production in Atoka sand at 4,000 ft. The new operation, projected to 4,200 ft., is listed as 1 McGuire, with location in 16-8n-19w. Shephens has an interest in the operation.

C. G. Glasscock Drilling Co., Corpus Christi, Tex., is under contract to Arkansas Fuel Oil Co. for an 8,000-ft. wildcat test, located in Tract 80, Copano Bay, 6 miles northwest of Rockport, in Aransas County, Texas Gulf Coast.

"If you are not too busy, I could use a little more weight on the bit!"

INFERNO

Steam Stack Blowers



Give You
Maximum Efficiency

Only 10% of the steam generated by the boiler is required to secure 425% boiler rated capacity, affording maximum efficiency with a minimum use of steam. Write for free copy of INFERNO Bulletin No. 22-A.

THE INFERNO CO.
Box 1138A
115 RICOU St.
SHREVEPORT, LA.

INSULATION MAINTENANCE

★ ★ ★ ★ ★

THE ABER COMPANY, INC.
P. O. Box 2535, Houston, Texas
Dallas, Shreveport, Tulsa, Baton Rouge

Offshore Well Locations and Surveys

Assured accuracy. Geodetic methods incorporate the use of modern, complete equipment—including Bilby Towers, Two-Way Radios, and Theodolites.

V. L. Beavers and Associates
International Airport
San Antonio 9, Texas
TAylor 6-6347—Collect
Branch Office—
503 Pioneer American Ins. Bldg.
Houston, Texas—ATwood 7428

AMERICAN IRON

"AMWELD"

Counterbore Weld Tool Joints

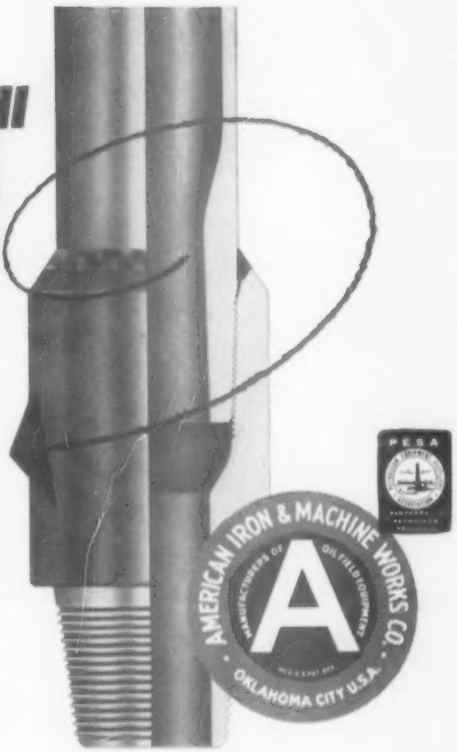
For operators who prefer API tool joints welded onto API drill pipe, American Iron AMWELD tool joints assure complete satisfaction.

Made from premium alloy steel, AMWELD tool joints are precision machined, heat treated and inspected to make them the best counterbore weld tool joint available.

AMWELD tool joints are welded to the drill pipe by submerged arc welding, the finest mechanically controlled welding process known.

Stronger counterbore welds resulting from controlled heats and controlled density of the weld metal are guaranteed by this completely automatic welding process.

This superior welding method plus rigid manufacturing and inspection standards mean that if you prefer a counterbore weld tool joint . . . AMWELD is your answer!



To get the best in counterbore weld tool joints . . . get American Iron "AMWELD"

THESE *will suit you to a* TEE

To meet the special requirements of the oil industry, Hercules offers both Regular Combination Thread Pumping Tees and Cross Tees. All are made of malleable iron in sizes to meet your requirements and are tested to 3,000 pounds.

Has both upset and plain threads in the bottom end or tubing connection; a line pipe thread in the side outlet with plain tubing thread in top connection and a 1" line pipe thread opening on back side for bleeder valve or pressure gauge. Made for 2", 2½", and 3", plain or upset tubing. All 2" Tees have a 2" side outlet; all 2½" and 3" Tees have 3" side outlet.

Combination Upset and Plain Thread Pumping and Flowing Tee

Cross Tees are made in size from 2" to 4" with any combination of threads in the several outlets. There are single threads in each of the bottom, top and side outlet connections which can be furnished plain or EUE. A 1" LP Thread Bleeder connection is furnished on all Pumping and Cross Tees. On the 4" Cross Tees, a 2" LP Thread Bleeder connection is available. "Custom-Made" Special Cross Tees with any combination of threads can be furnished upon request.

Hercules Cross Tee

SOLD AT ALL SUPPLY STORES

HERCULES TOOL

SINCE 1924

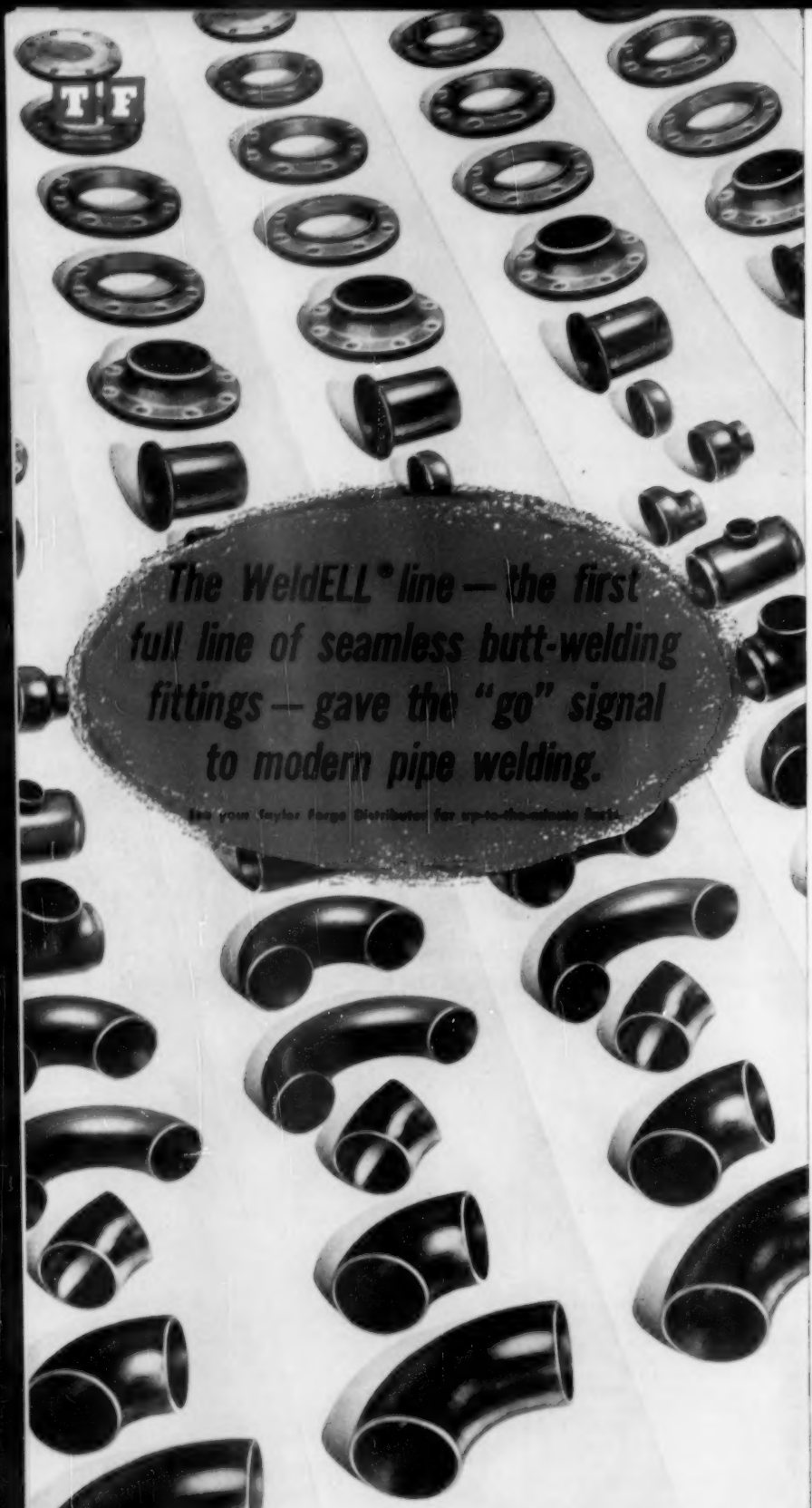
Write for Complete Information

HERCULES TOOL COMPANY

Manufacturers of Oil Field Equipment

GENERAL OFFICES AND PLANT • TULSA, OKLAHOMA

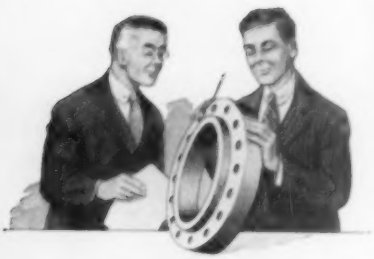
Export Representative Oil Field Equipment Co., Inc. • 30 Church Street, New York, N. Y.


The WeldELL® line — the first full line of seamless butt-welding fittings — gave the "go" signal to modern pipe welding.
See your Taylor Forge Distributor for up-to-the-minute facts

TAYLOR FORGE

TAYLOR FORGE & PIPE WORKS • General Offices and Works: P.O. Box 485, Chicago 90, Illinois

Offices in all principal cities • Plants at: Carnegie, Pa.; Fontana, Calif.; Gary, Ind.; Hamilton, Ontario, Canada



We had to quit guessing in the twenties

The founder of Taylor Forge used to say that "uniformity of strength should be the final goal of every engineer"... and no doubt this kind of thinking motivated the Taylor Forge organization to take so much initiative in the development of forged steel components for pressure piping.

The pattern was set in the twenties. Before 1920 little had been done in the way of pipe fitting and flange standardization. As early as 1905, however, Taylor Forge had produced forged steel flanges for Taylor pipe, and they had proved so superior to cast iron flanges that within a few years more flanges were being made for others than for our own use. But these forged flanges were bolted to the iron flanges of valves, pumps, and the like; so they simply followed cast iron standards.

In view of the obviously far greater strength of forged flanges, this was foolishly safe, and patently not at all in the "Uniformity of Strength" tradition. Moreover, in the twenties pressures were starting their upward climb. The 125 lb. and 150 lb. standard wouldn't do. Now it was 400; then 600; then 900 pounds. As the pioneer and leader in this field, Mr. Taylor saw the need for formulating standards and went to work on it.

Although one of the first studies conducted in this field, his work ranks to this day as one of the most thorough jobs ever done. In this work Mr. Taylor was in touch with Mr. Sabin Crocker, who is author of today's "Piping Handbook." He also collaborated with Professor E. O. Waters of Yale. Mr. Taylor ran exhaustive full scale tests on actual flanges to provide the test data which was then analyzed and formulated by Mr. Taylor and Professor Waters. The result was the Taylor-Waters Formula, presented before the ASME in 1927.

Still found in every engineering handbook, the Taylor-Waters formula was, and is, the basic means of determining flange stress under a given condition of loading. In the years since, Taylor Forge has also played a leading part in bringing standards into correlation with broadening needs . . . but this is *another* story.

An episode in the story of Taylor Forge leadership in designed piping

Save Time

. . . Use These Handy Time-Saver Cards

Want more information on products advertised in this issue? Or do you want to know more about the items described in the "New Equipment Section"? Or would you like some of the literature here mentioned?

Let us get it for you

Just use the convenient prestamped cards on this page. We'll forward your requests promptly.

To The Oil and Gas Journal. Please send me further information, without obligation, on items of New Equipment or Bulletins I have checked (✓) from your issue of March 14, 1955

(1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11) (12) (13) (14) (15) (16) (17) (18) (19) (20)
(21) (22) (23) (24) (25) (26) (27) (28) (29) (30) (31) (32) (33) (34) (35) (36) (37) (38) (39) (40)

I WOULD LIKE TO RECEIVE FURTHER DETAILS ON PRODUCTS ADVERTISED ON

Page____ By____ Page____ By____
Page____ By____ Page____ By____
Page____ By____ Page____ By____

PLEASE PRINT
COMPANY NAME .....
STREET ADDRESS .....
CITY ..... ZONE NO. ..... STATE .....
NAME ..... TITLE .....
This card void after 90 days.

Postage Will be Paid by Addressee

No Postage Stamp Necessary If Mailed in the United States

BUSINESS REPLY CARD
First Class Permit No. 2, Tulsa, Oklahoma

THE OIL AND GAS JOURNAL
P. O. BOX 1260
TULSA, OKLAHOMA

2

Check here FOR NEW EQUIPMENT *or* LITERATURE

Mark here FOR MORE INFORMATION ON ADVERTISED PRODUCTS

To The Oil and Gas Journal. Please send me further information, without obligation, on items of New Equipment or Bulletins I have checked (✓) from your issue of March 14, 1955

(1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11) (12) (13) (14) (15) (16) (17) (18) (19) (20)
(21) (22) (23) (24) (25) (26) (27) (28) (29) (30) (31) (32) (33) (34) (35) (36) (37) (38) (39) (40)

I WOULD LIKE TO RECEIVE FURTHER DETAILS ON PRODUCTS ADVERTISED ON

Page____ By____ Page____ By____
Page____ By____ Page____ By____
Page____ By____ Page____ By____

PLEASE PRINT
COMPANY NAME .....
STREET ADDRESS .....
CITY ..... ZONE NO. ..... STATE .....
NAME ..... TITLE .....
This card void after 90 days.

Save Time

. . . Use These Handy Time-Saver Cards

Postage Will be Paid by Addressee

No Postage Stamp Necessary If Mailed in the United States

BUSINESS REPLY CARD
First Class Permit No. 3, Tulsa, Oklahoma

THE OIL AND GAS JOURNAL
P. O. BOX 1260
TULSA, OKLAHOMA

3

To The Oil and Gas Journal: Please send me further information, without obligation, on items of New Equipment or Bulletins I have checked (✓) from your issue of March 14, 1955

(1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11) (12) (13) (14) (15) (16) (17) (18) (19) (20)
(21) (22) (23) (24) (25) (26) (27) (28) (29) (30) (31) (32) (33) (34) (35) (36) (37) (38) (39) (40)

I WOULD LIKE TO RECEIVE FURTHER DETAILS ON PRODUCTS ADVERTISED ON

Page____ By____ Page____ By____
Page____ By____ Page____ By____
Page____ By____ Page____ By____

PLEASE PRINT
COMPANY NAME_____
STREET ADDRESS_____
CITY_____ ZONE NO._____ STATE_____
NAME_____ TITLE_____
This card void after 90 days.

Postage Will be Paid by Addressee

No Postage Stamp Necessary If Mailed in the United States

BUSINESS REPLY CARD
First Class Permit No. 3, Tulsa, Oklahoma

THE OIL AND GAS JOURNAL
P. O. BOX 1260
TULSA, OKLAHOMA

The cards shown here are supplied for your convenience. Just ✓ ✓ ✓ check the circle with the number of the item in which you are interested, tear off the card, and drop it in the mail.

We do the rest

If you want additional information on any product advertised in this issue, note the page number on the card.

We'll get it for you

(No postage required)

. . . What's New in Equipment?

Use the handy Time-Saver Cards ✔✔✔ to obtain additional information on these items

by Dan B. Miller

Automatic Logger Handles Industrial Data

A new packaged data-reduction system for converting pneumatic or electric signals into tabulated digital records may be integrated with industrial instrumentation systems currently in use for automatic control, computing, cost accounting, statistical analysis, or process reset with a punch-card programmer.

Developed especially for transition from manual or semiautomatic operation to completely automatic process control, the Automatic Logger is compatible with present control instrumentation, and is versatile for future reapplication. Measurements of pressure, temperature, flow, weight, stress, level, or other variables of concern to operating, engineering, and accounting personnel are automatically recorded in individual vertical columns on the log sheet, so that any variable may be readily scanned for trends. A punched tape with identification digits for each variable is punched simultaneously with the typed log, providing data in a convenient form for further computations.

Readout may occur at hourly, half-hourly, or other preset intervals. The Automatic Logger samples the measured variables continuously and stores the essential information to be logged at the subsequent readout period. Thus, readout may be the accumulated total of the variable, or the average over the time cycle.

Mechanical or electrical memories are provided for rapidly varying inputs so that measurement of the variables may be made at the same instant of time, even though recording of data occurs sequentially over an extended period. Between periodic readout cycles the Automatic Logger scans and monitors all variables continuously, and records abnormal conditions occuring at any time. These emergency or upset conditions are printed in red and may, at the user's option, record abnormal conditions only, record all readings on the occurrence of an abnormal condition, or record the abnormal reading together with associated variables to be selected by the user. Of course, the usual readout will proceed independently on schedule. The operator may vary the length of the readout cycle by rotating one control. *Fischer & Porter Co.*

Check No. 1 On The Time-Saver Card

●

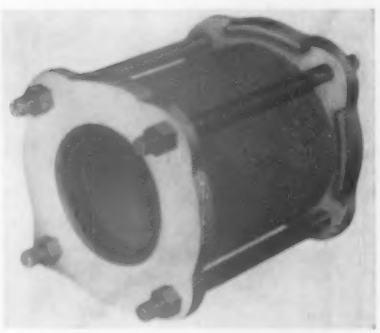
Test Bomb Is Redesigned For Increased Service

A new copper-strip-corrosion test bomb is to be used for ASTM D 130 "Test for Copper Corrosion by Petroleum Products." The bomb is recommended for testing of aviation gasolines, automotive gasolines, distillate fuel oils, and certain other petroleum products.

Approved by ASTM, the new design eliminates many of the objectionable features of the bomb formerly used. A safety pressure release prevents cover blowoff while the bomb is being dismantled after heating. Other new features are: a hook eye fastened to the bomb cover, facilitating handling of the bomb, and a new O-ring gasket, assuring long life and leakproof service. *Precision Scientific Co.*

Check No. 2 On The Time-Saver Card

●



Adaptor Coupling Fits Variety of Pipe Sizes

A new corrosion resistant line-pipe adaptor is designed to reduce field inventories while increasing installation conveniences. Easily installed and dismantled, the new Little Giant adaptor coupling is designed so one standard size fits a variety of pipe classes and materials.

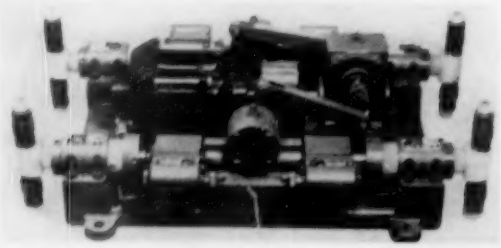
The coupling will join cement-asbestos (all classes in the same size); cement asbestos to steel; steel to steel; and plastic to steel. It is also furnished in reducers of various sizes.

A bolt-type coupling, this new product has cement-asbestos body and high-strength iron flanges. A seal is accomplished by pressures against oil-resistant synthetic-rubber gaskets between flanges and body. It is available in straight sizes of 3 to 12 in., and combination sizes.

The adaptor coupling is primarily for use on salt-water lines, water-flood systems, fresh-water systems, and lead lines. *Johnson-Fagg Engineering Co.*

Check No. 3 On The Time-Saver Card

What's New... Use the handy Time-Saver Cards



Pumps Made With Plastic Fluid Ends

The U-type pump is offered with two types of plastic liquid ends. Pump-body and check-valve assemblies are manufactured of unplasticized polyvinyl chloride or Kel-F. Used in conjunction with ceramic pump plungers and ceramic check-valve balls, these plastics offer excellent resistance to such fluids as ferric chloride, sodium hypochlorite, cupric chloride, and hydrochloric, hydrofluoric, and nitric acids.

U-type pumps with plastic liquid ends have capacities up to 19 gal. per hour per feed and are all available in one, two, three, or four feed units. Pumps with plunger diameters from ¼ to ½ in. may be used to develop pressures up to 300 psi., ⅝ to 1-in. plunger diameters may be used for pressures up to 150 psi. Maximum temperature at which P.V.C. pumps can be used is 150° F; Kel-F pumps may be used at temperatures to 250° F.

Plastic liquid-end assemblies and check valves are also available to convert existing metal U pumps to plastic construction, and are completely interchangeable with the metallic liquid ends. *Hills-McCanna Co.*

Check No. 4 On The Time-Saver Card

●

Sprayed Insulation Foams To Increase Thickness

A new idea in industrial insulation is a resinous liquid that is sprayed like paint, but immediately foams to 20 times its original thickness. The material is known as Poly-Cell.

The outstanding advantage is the speed at which irregular surfaces can now be insulated. Normally, it requires considerable cutting and fitting to properly place insulation around valves, fittings, flanges, and other such projections.

Poly-Cell eliminates both the fitting and the fastening tasks. Being sprayable, it can be installed wherever a spray gun can be pointed. It also will adhere of its own nature to practically any type of clean, dry surface. It will adhere equally well to moist surfaces.

Poly-Cell is sprayed as a liquid and at first it resembles a heavy coat of varnish. After a few minutes, however, it has swollen to a thick, airy cushion. After 15 minutes, the foaming action has ceased, leaving a normal looking semirigid insulation.

Poly-Cell insulation can be applied at any desired thickness in one coat, varying the amount of liquid originally sprayed. Its most economical thickness is ½ to 1 in.

The number of square feet covered by 1 gal. of Poly-Cell will vary with the thickness to be obtained. Some idea of coverage can be realized from the fact that 1 gal. of the liquid, when sprayed over 100 sq. ft., will foam to a thickness of ⅜ of an inch.

The K factor of Poly-Cell per inch of thickness is 24 and weight is slightly more than 2 lb. per cu. ft. The high-temperature limit is 225° F. The lowest temperature at which the product has been tested so far is —40° F. Poly-Cell meets specifications involving fire resistance. *Insul-Mastic Corp. of America.*

Check No. 5 On The Time-Saver Card

Heavy-Duty Ratchet Head Features Improved Action

A ¾-in. square-drive heavy-duty ratchet head is drop-forged from selected alloy steel, fully heat-treated for added strength, and finished in satin chrome plate. Its heavy-duty ratchet gear has 24 teeth instead of the usual 16 for quick, smooth action. The shift lever on the head reverses ratchet action instantly.

A choice of two handles is available, plain or with knurled handle grip. A handle length of 20 in. offers more than adequate leverage for this rugged ratchet head. *J. H. Williams & Co.*

Check No. 6 On The Time-Saver Card

●

Hydraulic Tubing Tong Provides More Torque

BJ Hydratorc, a new hydraulic-powered tubing tong, provides more horsepower, more speed, and more workpower for tubing, workover, and slim-hole drilling. The new Hydratorc delivers as much as 12 hp. continuously if required, operates at 75 to 100 r.p.m. at high speed, thus providing greater speed and a more powerful drive under practically all operating conditions. It provides 1,650 ft.-lb. of torque in high speed and up to 6,300 ft.-lb. in low speed.

The unit features a heavy-duty transmission designed to handle the increased horsepower and torque output of the hydraulic motor without overloading or strain. Its automatic control consists of a single valve that controls all operations. The valve is pushed forward for spinning up and back for release, automatically disengaging the jaws from the pipe and aligning the

DOWELL MAKES NEWS WITH FRAC ACID

New combination acid-fracture treatment produced 1000 BOPD more than oil-base fracturing job

Frac Acid*, a new type of treatment developed by Dowell, is used to fracture and acidize oil and gas wells—in one operation!

Here's an example of its effectiveness. Three wells completed in a limestone formation offset each other. One produced only 90 BOPD after treatment with a total of 40,000 gallons of regular acid. The second well produced 240 BOPD after a 20,000 gallon oil-base fracturing treatment.

Then Dowell engineers fractured the third well using 15,000 gallons of Frac Acid. As a result of this service, the well produced at the rate of 1248 BOPD!

In Frac Acid treatments the fracturing fluid is inhibited hydrochloric acid thickened to carry suspended sand. Chemical additives like those used in regular acidizing may be incorporated as desired. Wells have cleaned up readily after Frac Acid treatments. No gel-breaker solution or shut-in time is required.

See how Frac Acid can help you achieve more successful well completions. Telephone your nearest Dowell office, or write DOWELL INCORPORATED, Tulsa 1, Oklahoma, Dept. C-11.

*A service mark of Dowell Incorporated

services for the oil industry

DOWELL

A SERVICE SUBSIDIARY OF THE DOW CHEMICAL COMPANY

gripping mechanism for removal. As a safety feature, this control automatically reverts to neutral or off-position when released. An adjustable pressure-relief valve permits the operator to set the make-up torque, and assure uniform makeup of the entire tubing string.

The Hydratorc operates off the regular hydraulic system provided to raise mast-type rigs. The Hydratorc can also be supplied with auxiliary trailer-mounted hydraulic power source if desired.

The large opening in the rotating ring is aligned for instant stabbing or removal from the tubing by the positioning valve. The interchangeable jaws and bushings handle all standard tubing sizes and a sucker-rod, break-out clamp for stripping operations on rods can be supplied. *Byron Jackson Co.*

Check No. 7 On The Time-Saver Card

●

Emsco Perfects New Drilling-Mast Design

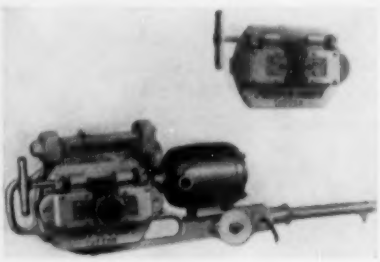
The new B-127 portable drilling mast is of open-faced design, an extremely sturdy mast with a 416,000-lb. nominal gross capacity. It is 127 ft. in height, with a top dimension of 4 ft. 6 in. by 4 ft. 6 in., a base dimension of 8 ft. by 15 ft., and capable of handling trebles in 90-ft. stands.

The mast introduces several new design features such as: four-legged construction, ground-level assembly, simplified pin-and-tie-bolt connections for all mast sections, and positive line control during raising and lowering operations, which eliminates snubbing lines.

Strength is achieved through the design of the structure in which a minimum amount of internal bracing is used to allow necessary block clearance. The erection gin pole is not an essential part of the mast. It is used only for raising and lowering, and carries none of the working load. No guy wires are necessary. The B-127 mast is designed to safely withstand wind velocities of 75 m.p.h. on the mast with a full setback of pipe. *Emsco Manufacturing Co.*

Check No. 8 On The Time-Saver Card

●



Port-A-Pony Accessory Cuts, Grooves, and Bevels

A new accessory for the Port-A-Pony portable power pipe threader is a 12-lb. pipe cutter which power cuts ½ to 2-in. pipe in 30 seconds. It can be attached to the 26-lb. Port-A-Pony power drive in 10 seconds.

Spring-fed knives give constant controlled pressure. One set of cutting knives are included with the unit. Grooving and beveling knives are also available. All knives can be quickly changed. An important feature is a safety guide which prevents gouging and burring. This assures the operator a clean cut that's easy to thread or join. *Thread-Ezy Manufacturing Co.*

Check No. 9 On The Time-Saver Card

●

Hydraulic Transmission Applicable to Drilling

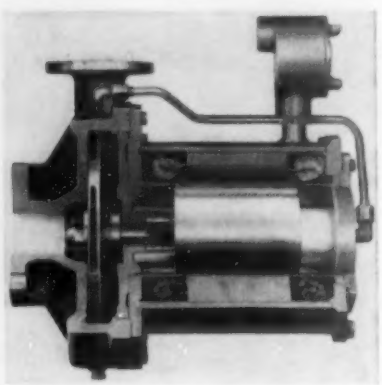
Mekydro is a hydraulic, four-speed power transmission consisting of a hydraulic torque converter with disconnecting turbine portion and a mechanical change gearing, the principle of which is based on the Maybach overrunning claw. The drives are changed mechanically whereby the converter remains constantly filled. When put in drive, the vehicle moves immediately and the gears shift automatically.

The Mekydro transmission achieves its highest efficiency quickly at a low-running speed and maintains it almost constantly to its top speed. This feature makes the transmission suitable for heavy-duty trucks as well as passenger trains with high top speeds.

With its hydraulic starting process and automatic gear shifting, the mileage obtainable is dependent on the service life of gears and antifriction bearings. Mekydro transmissions with axle drives are available for engine powers from 300 to 1,000 hp. They are also applicable for deep-well drilling. *Maybach Motorenbau G.m.b.H.*

Check No. 10 On The Time-Saver Card

●



Small Sealless Centrifugal Pump Provides High Heads

Guaranteed not to leak, the new 1½ hp. Model CFH series pumps give heads to 150 ft. at capacities to 53 g.p.m.

Offered in cast iron, 316 stainless steel, Monel or Carpenter-20, these sealless centrifugals combine pump and motor in a single compact unit. Pumped fluid is allowed to circulate through the rotor chamber of the motor, isolated from the stator parts by a stainless-steel liner. This circulation serves to lubricate the bearings and cool the motor.

Ideal for users requiring leakproof pumping at high heads and relatively low capacities, the standard Model CFH Chempump handles corrosive, explosive, and other problem fluids at temperatures to 450° F. and pressures to 300 psi. *Chempump Corp.*

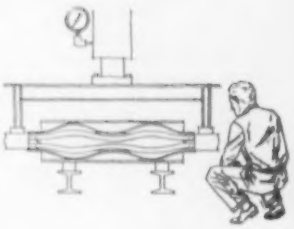
Check No. 11 On The Time-Saver Card

Inspect it –

IT LOOKS BETTER

Test it –

IT CHECKS OUT BETTER



Use it –

"MAXIMUM PERFORMANCE" JOB

LARKIN EXCEEDS EVERY KNOWN REQUIREMENT FOR CENTRALIZER PERFORMANCE

Based on established standards, Larkin Centralizers

Take 45% less permanent set than maximum allowed

Exert 300% more initial centering force than minimum required

Start easily without bumping or snubbing

FIVE RANGES—FOUR TYPES. Each of the four different types of Larkin Centralizers come in five different ranges.

The Short Larkin Slip-On and Lok-On Centralizers fill the requirements of efficiency and economy in shallower areas or on short strings in undeviated holes.

Specify Larkin to your Supply Store.

LARKIN

...Through Your Supply Store

LARKIN PACKER COMPANY, INC. • **ST. LOUIS, MO.**

AT LAST....
A STANDARD PIPE ANCHOR

Bos-co
UNIVERSAL
PIPE ANCHOR

- Less expensive than special strap anchors.
- Handier; no more waiting to have anchors made.
- Pipes of same size can be stacked and valuable space saved.
- Adaptable for many uses.

Available At Your Supply Store

Bos-co
EQUIP'T ENG'R'G & MF'G.
526 South Boulder Ave., Tulsa, Oklahoma

SAVE 70%
Over Sign-Painting Costs With
DECALS

Stan Ramsey customers report savings high as 70% over costs of hand-painted signs. For example, we can furnish you 125 decals, size 10"x10", for as little as $1.33 each!

Take Advantage of FREE Advertising Space!

Oil men have found that Stan Ramsey decals on their cars and trucks can do a real SELLING job at no space cost! They're colorful, durable, easy to apply . . and designed especially for each customer! Contact us for details, today!

Stan Ramsey
COMPANY, INC.
Designers and Manufacturers of DECALS
2727 NORTH OKLAHOMA AVE.
OKLAHOMA CITY, OKLA.

They're NEW

- Bulletins
- Catalogs
- Brochures

for your copy, check ✓ ✓ the Time-Saver Cards.

Electronic Tank Gage, offers installation information and engineering details of tank-gaging equipment designed to give accuracy to within 1/16 of an inch. This electronically operated gage is capable of remote transmission with equal accuracy. *Gilbert & Barker Manufacturing Co.*

Check No. 12 On The Time-Saver Card

●

Tenite Butyrate Pipe. This bulletin discusses applications in which Tenite butyrate pipe can be used to advantage, the physical properties of the pipe, and oil-industry transfer jobs where this pipe can solve problems. The material lists companies manufacturing Tenite pipe and fittings. *Eastman Chemical Products, Inc.*

Check No. 13 On The Time-Saver Card

●

Unit Rig Traveling Blocks, a four-page, multicolor brochure presents cutaway illustrations of a new line of traveling blocks now being offered by a long-time manufacturer of drilling equipment. An exploded view illustrates particular features of side plates, guide fingers, integral hook, sheaves, bearings, and centralized-lubrication system. A data chart and line drawings give all engineering information. *Unit Rig & Equipment Co.*

Check No. 14 On The Time-Saver Card

●

Hayward Tyler-Byron Jackson Chemical Pumps. Perforated for binding, this four-page, four-color bulletin features a cutaway illustration and an engineers' drawing of this line of centrifugal pumps. The bulletin includes a table of material specifications and lists design features. Four basic sizes are available, giving a range of capacities up to 600 I.g.p.m. and heads up to 230 ft. *Hayward Tyler & Co., Ltd.*

Check No. 15 On The Time-Saver Card

●

Southern Constructors-Designers-Engineers illustrates the facilities and some of the projects of a West Coast engineering firm. The multicolor brochure

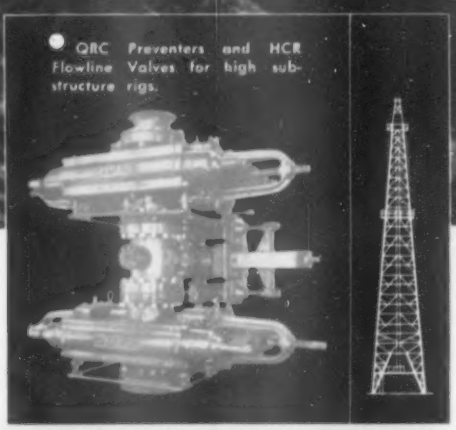
Designers
- PIPING
- STRUCTURAL

To design new oil-refineries and chemical plants. Please send your resume to our Personnel Department. Your letter will receive immediate and confidential attention.

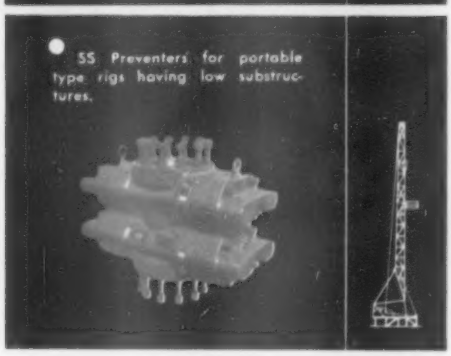
C F BRAUN & CO
Engineers
Constructors
ALHAMBRA, CALIFORNIA

REGARDLESS OF SIZE or the number of items, Tulsa Crating Company is geared to handle your crating and packaging problems. Over 35 years experience in domestic and export shipping is your assurance that at Tulsa Crating Company you get Precision Engineered packaging and crating. Every crating job is carefully analyzed and the packaging designed to meet its individual requirements. An Export Department, well qualified to handle any type of export shipment, is fully familiar with the maze of customs regulations that govern export shipping. So, no matter what your crating or shipping problem, no matter how small or how big the item is, call Tulsa Crating Company, 519 South Rockford, Tulsa, Okla. Phone 3-6482 or 3-3492. *Adv.*

● QRC Preventers and HCR Flowline Valves for high substructure rigs.



● SS Preventers for portable type rigs having low substructures.



Blowouts still happen . . . as witnessed above . . . even on the best regulated rigs, but Cameron Drilling Control Equipment, in the hands of safety-conscious operators, has gone a long way toward eliminating blowouts. As drilling depths have increased, so have well pressures, and the need for more dependable pressure control equipment. Constant research and improvement in this field has enabled Cameron not only to keep abreast but to keep ahead of the industry's needs.

Cameron

IRON WORKS, INC.

P. O. Box 1212, Houston, Texas

Export Office: 7912 Empire State Bldg., New York City. In England: British Oilfield Equipment Co., Ltd., Time & Life Bldg., New Bond Street, London W. 1 England.

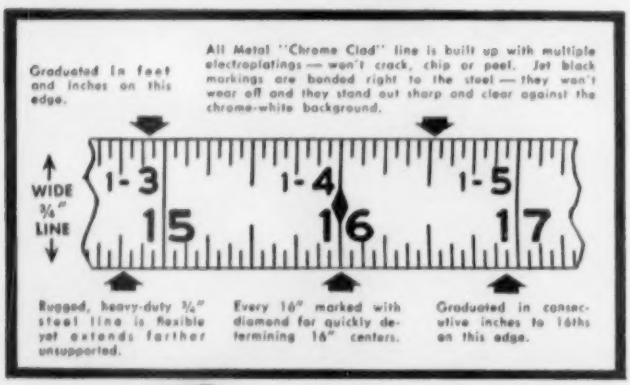
New . . .

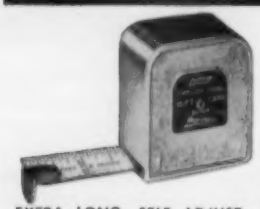
a heavy duty tape rule with a wide 3/4" line in CHROME CLAD . . . It's the Finest Ever Made!

LUFKIN CHROME CLAD Super MEZURALL

IN 10 FT. (C9310) AND 12 FT. (C9312) LENGTHS

For long rugged use, the new Lufkin Chrome Clad Super Mezurall can't be equalled. The blade, which extends farther unsupported, is easily replaceable if accidentally damaged.


Graduated in feet and inches on this edge.
All Metal "Chrome Clad" line is built up with multiple electroplatings — won't crack, chip or peel. Jet black markings are bonded right to the steel — they won't wear off and they stand out sharp and clear against the chrome-white background.
WIDE 3/4" LINE
1-3
1-4
1-5
15
16
17
Rugged, heavy-duty 3/4" steel line is flexible yet extends farther unsupported.
Every 16" marked with diamond for quickly determining 16" centers.
Graduated in consecutive inches to 16ths on this edge.



EXTRA-LONG SELF-ADJUSTING END HOOK permits accurate hook-over or butt-end measurements.

MAGIC METAL CASE

New alloy metal makes this the lightest, yet toughest and strongest die-cast case made.

PACKED IN FREE "SEE THRU" RE-USABLE BOX

Each Chrome Clad tape rule comes in a beautiful 2-color plastic box with hinged cover and snap fastener.

SUPER MEZURALL ALSO AVAILABLE WITH "WHITE CLAD" BLADE

BUY LUFKIN TAPES • RULES • PRECISION TOOLS FROM YOUR SUPPLY HOUSE

337-R

THE LUFKIN RULE CO., SAGINAW, MICH.
132-138 LAFAYETTE ST., NEW YORK CITY • BARRIE, ONT.

also lists clients by whom the firm has been engaged. *Southern Engineering & Construction Co.*

Check No. 16 On The Time-Saver Card

●

New 5-Gal. Packaged Pilot Plant. This product data sheet describes a 5-gal. distillation pilot plant. Consisting of a reactor, agitator, condenser, and decanter, this standard unit can be used to study hundreds of chemical processing operations. Included in the data sheet are specifications on component parts, electrical controls, and the cooling and heating systems. A photo and a large labeled drawing of the unit are also included. *Patterson-Kelley Co., Inc.*

Check No. 17 On The Time-Saver Card

●

Type HMC, Integral-Seal Process Pumps. A new Bulletin No. W-341-B17 on single-stage, vertical-split pumps offers information on refinery HMC process pumps with integral mechanical seal. A table provides data on capacity, head, suction, and discharge pressure and temperature for sizes 1½ through 4 in. Three additional tables provide information on bearing assemblies, flange data, materials of standardized construction, and interchangeability. *Worthington Corp.*

Check No. 18 On The Time-Saver Card

●

New ITV-6 Industrial Television Equipment. Catalog E.51, just issued by Radio Corp. of America, describes the new ITV-6 industrial television equipment manufactured by the company. Features, applications, and construction details on closed circuit television are illustrated and described. Specifications are also listed. *Radio Corp. of America.*

Check No. 19 On The Time-Saver Card

●

Corrosion Control. A single source of responsibility for complete corrosion control, offered to gas and pipeline companies, is covered in this four-page, two-color folder. The service described begins at the storage rack and continues through final inspection in the field. *Irish Engineering Service.*

Check No. 20 On The Time-Saver Card

●

Rockwell Multistage Quantity-Control Valves. A new six-page bulletin (O.G. 454) describes Rockwell methods of industrial liquid metering with multistage quantity-control valves, which are available in iron, steel, 316 stainless,

The CLEVELAND "240"

digs 'em all, from 20"-36" wide, down to 6' 3" deep

The Cleveland "240" Trencher is a combination of practical, performance-proved features—from its big power plant right down to its rooter tips. Perfectly balanced at the exact center of its non-packing crawlers, 100% equipped with anti-friction bearings, it negotiates the wettest rights of way, overcomes the toughest hills.

With big depth capacity and rugged 3 bucket tooth pattern, the "240" fits all jobs, long or short, down to 6' 3" deep and up to 3' wide . . . pipeline projects . . . irrigation jobs . . . drainage work . . . water and sewer lines . . . conduit and cable work . . . any job where there's trench to be dug.

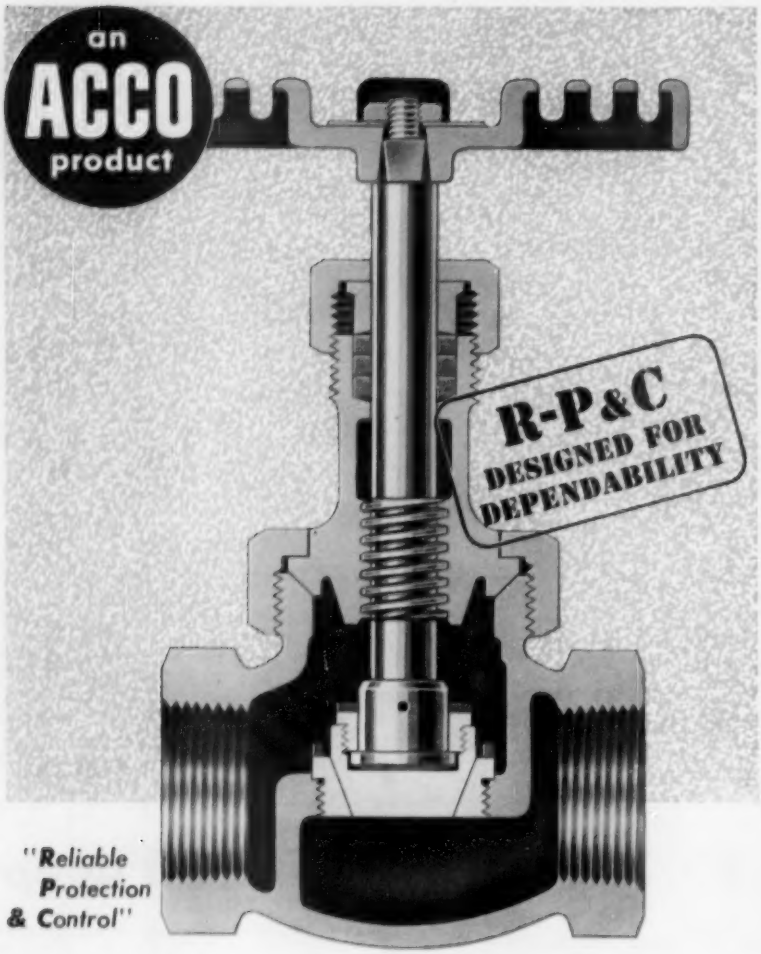
By its superior digging performance for owners the "240" has proved its ability to dig *more trench—in more places—at less cost,* has earned its proud position in the famous Cleveland *quality* line of trenchers that are *Good* Everywhere.

- More than 30 Usable Digging Speed Combinations from ½ f/m to over 37 f/m.
- 70 H.P., 469 cu. in. Diesel Engine.
- Clog-proof Crawlers, 100% Anti-Friction Bearing Mounted.
- Crawler Kick-out Clutch Increases Production, Adds Life.
- 3" Front Upper Truck Shaft Carries Wheel, Conserves Power, Saves Wear.
- Shiftable Conveyor, 30" Wide x 8' (or 10' 9"), 600 f/m speed.
- 15 Buckets, Patented Design, 3 Bucket Tooth Pattern.

Get the full story on this CLEVELAND from your local distributor or write for "240" Bulletin S-119 and Full Line Bulletin S-120.

THE CLEVELAND TRENCHER CO. • 20100 ST. CLAIR AVENUE • CLEVELAND 17, OHIO

CLEVELAND



"Reliable Protection & Control"

New R-P&C Bronze Globe Valve

—STAINLESS STEEL SEAT AND DISC (500 BRINELL)
—FULL-PLUG FOR CLOSER REGULATION, LONGER LIFE

R-P&C's new **Fig. 427-DP** bronze globe valve is recommended for steam, water, oil and gas service where control or regulation of flow is required. Its 500 Brinell stainless steel seat and disc resist wire-drawing—make it particularly suitable for continuous throttling and other severe applications.

• The Fig. 427-DP is packed with the quality features that users expect from R-P&C. For example, the union bonnet for added strength and convenience, and a disc and seat ring construction which permits regrinding without removing the valve from the line. The full-plug construction, with its exceptional wide seating surface, gives closer control, longer life.

• The Fig. 427-DP is rated for 300 lbs. Steam—1000 lbs. OWG in sizes ¼" to 2", and 600 OWG in sizes 2½" and 3". Also supplied as an angle valve. Precisely designed, it is a fitting addition to R-P&C's complete line of bronze valves—gates, globes, angles and checks, in pressure classes from 125 to 300 lbs. See your R-P&C Distributor or write for catalog.

ACCO

R-P&C Valve Division
AMERICAN CHAIN & CABLE

Reading, Pa., Atlanta, Boston, Chicago, Denver, Detroit, Houston, New York, Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.

R-P&C valves

and bronze. The bulletin illustrates and describes meters, valves, registers, and other equipment for this type of metering. It also features line drawings and descriptions of typical hookups recommended for specific metering applications. Performance curve and flow-range charts are also included, the former illustrating how hydraulic line shock is minimized and pressure smoothed out by multistage quantity control. *Meter & Valve Division, Rockwell Manufacturing Co.*

Check No. 21 On The Time-Saver Card

●

PTM Post Tracing Medium. A new fact file on PTM patented Post tracing medium contains working samples of the paper with facts on the benefits such as filmlike transparency, evenly textured surface, and dimensional stability. *Frederick Post Co.*

Check No. 22 On The Time-Saver Card

●

Parallel Shaft Gear Drives in New Link-Belt Book. A complete line of parallel shaft gear drives is described in a new 32-page book, No. 2619. Listed are 39 standard-size drives for the efficient vibration-free transfer of power, together with a complete line of baseplates and built-in backstops. Single, double, and triple-reduction drives permit standard ratio selections from as small as 1.2 to 1 to as large as 323 to 1, with horsepower capacities of over 2,000. *Link-Belt Co.*

Check No. 23 On The Time-Saver Card

●

Radioactivity Surveying, a four-page pamphlet describes air and jeep-borne radioactivity surveying equipment. The folder describes special scintillation equipment used for oil and uranium prospecting, gives a complete list of literature references, and provides complete specifications and prices. *Tracerlab, Inc.*

Check No. 24 On The Time-Saver Card

●

Check the Facts. A new 12-page illustrated information booklet points out 100 characteristic facts of the new line of Reliance totally protected a.c. motors. Included is a classification of the significant points common to all Reliance a.c. motors with a further breakdown of information pertaining specifically to the protected and enclosed motors. The enclosed group is also further broken down with facts on the fan-cooled, corrosionproof, and explosionproof designs. *Reliance Electric & Engineering Co.*

Check No. 25 On The Time-Saver Card

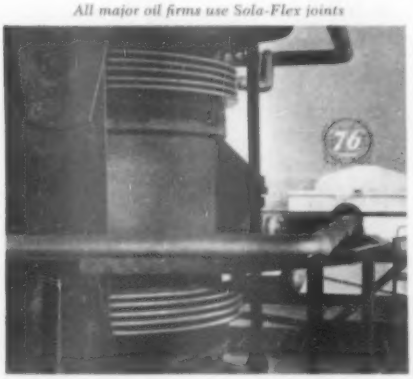
World's largest stainless steel bellows custom designed by Solar engineers

THE HUGE EXPANSION JOINT shown above, as tall as a three story building, was designed and fabricated by Solar for a research facility. It is one of 13, ranging from 5 to 28 feet in diameter, produced for the project. These units, which include the largest metal bellows ever built, are typical of the varied design and production problems solved by Solar engineers.

Sola-Flex bellows are fabricated of stainless steels and other high alloys, to cope with stringent conditions of temperature, pressure and corrosion. They are readily available in many shapes and sizes —from ½ in. upward. Fully conforming with API-ASME Codes, Sola-Flex joints are used and endorsed by all of the major oil companies.

Every Solar-built expansion joint or convoluted coupling embodies special Sola-Flex designs, resulting from intensive research and engineering programs. These designs provide long and trouble-free service life. Write for the latest Sola-Flex catalog, today!

All major oil firms use Sola-Flex joints



SOLAR
AIRCRAFT COMPANY
SAN DIEGO
DES MOINES

DESIGNERS, DEVELOPERS AND MANUFACTURERS OF METAL ALLOY PRODUCTS

This is What Solar Offers You

Solar specializes in the manufacture of precision products from alloys and special metals for severe service. Solar's experience since 1927 is unduplicated in this field. Solar skills and facilities range from research, design and development through to mass production. Wherever heat, corrosion or difficult specifications are problems, Solar can help you solve them.

PLANTS. *In San Diego and Des Moines (photograph above). A total of 1,400,000 sq ft of floor space. Approximately 5,000 employees. Annual sales over $65,000,000.*

EQUIPMENT. *Production equipment for all types of metal fabrication —forming, machining, welding, brazing, casting, coating. Extensive laboratory and testing equipment. Facilities for development, prototype, limited or mass production.*

SERVICES. *Research, design, development, tooling and production engineering staffs. Experienced with all alloy steels, stainless alloys, super alloys, and titanium and its alloys. Government source inspection and Solar quality control meet rigid aircraft and commercial standards.*

CONTRACT PRODUCTION

Current orders include aircraft engine and airframe parts, alloy castings, pneumatic ducting, atomic energy components. Customers include some of the most honored names among aircraft and industrial companies in the U.S. and Europe.

SPECIAL PRODUCTS

Bellows. *"Sola-Flex"® bellows and expansion joints in many designs from ½ in. up to the world's largest, 28 ft in diameter.*

Gas Turbines. *Solar "Mars" 50 hp engines for auxiliary generator sets, ground carts, portable fire pumps; Solar "Jupiter" 500 hp engines in variable and constant speed models.*

Ceramic Coatings. *"Solaramic"® is the Solar trade mark for a family of coatings that protects metals from heat, corrosion, galling and abrasion.*

Controls. *Complete control systems utilizing the new Solar "Microfet"® principle for control of gas turbines, jet engines and pneumatic devices.*

FURTHER INFORMATION
Your inquiry regarding any Solar service of facility will receive prompt attention. Address
Solar Aircraft Company
Department A-82
San Diego 12, California

EQUIPMENT MEN . . . in the News

Orbit Valve Names O'Connor As Export Representative

D. T. O'CONNOR

The appointment of D. T. O'Connor to act as export representative for Orbit Valve Co., has been announced by J. Dock Mumford, vice president of Orbit. O'Connor, who is well known in export circles, will represent Orbit in South America, Europe, Near, Middle, and Far East. His offices are located in New York City. From there he serves several well-known manufacturers of petroleum equipment.

Burgess-Manning Elects Paddock a Vice President

S. G. Paddock, manager of the Dallas division of Burgess-Manning Co., manufacturers of industrial noise-abating equipment and industrial metering and measuring instruments, has been elected a vice president of the company, Ralph L. Leadbetter, president, has announced. Paddock also is a sales director of the company.

Paddock's election followed a merger of Burgess-Manning Co. with Penn Industrial Instrument Corp., Philadelphia. At the same time, William C. Bennett, former president of Penn, was elected a vice president and director of Burgess-Manning, and William Melas, Penn's first vice president, was named a director of the merged concern.

Paddock has been with Burgess-Manning for 20 years. When the Dallas division was formed in 1951, Paddock was appointed sales manager and last year was promoted to division manager and director of the company's nationwide sales organization.

Magcobar Names Two New Division Managers

James R. Homan has been named California division sales manager and Roy C. Stringfellow has been appointed

J. R. HOMAN

STRINGFELLOW

manager of the Shreveport division, according to an announcement by George H. Moore, general sales manager for Magnet Cove Barium Corp., Houston drilling-mud firm.

Homan was formerly a Magcobar sales representative in Oklahoma City following extensive experience in drilling activities in the Middle East.

Stringfellow, formerly a district manager in the Shreveport division, began with Magcobar as a field service engineer in 1949.

Galloway-Wallace Elected To Membership in A.A.A.A.

The election of Galloway-Wallace Advertising Agency, Oklahoma City, to membership in The American Association of Advertising Agencies has been announced early this month.

Galloway-Wallace, one of the pioneer advertising agencies in the Southwest, is operated by Hugh M. Wallace and John W. Wallace, and presently handles both industrial and consumer accounts.

The American Association of Advertising Agencies was founded in 1917 to promote high professional standards in the advertising-agency business. A.A.A.A strives to increase the efficiency of advertising as a means of lowering distribution costs. Membership in the organization is predicated on experience, facilities, professional ability, and financial standing. Member agencies have access to extensive A.A.A.A. research facilities.

Welex Jet Opens New Office at Snyder, Tex.

With the opening of a new office in Snyder, Tex., Welex Jet Services, Inc., offers the complete services of the company to oil producers in the area. The manager of the new office is E. B. (Ed) Schulz. He has been with Welex Jet for over 3 years. He has worked in both the Kansas and West Texas oil fields. Prior to his present position, he was sales engineer of the Welex district office in San Angelo, Tex.

Pritchard Promotes Bodle And Laughrey to Key Posts

Two promotions in the Pritchard organization have recently been announced by J. F. Pritchard & Co., Kansas City, engineers and constructors for the power, petroleum, gas, and chemical industries.

W. W. Bodle, manager process and research department, has been named manager of Pritchard's Chicago district office. Paul W. Laughrey was named manager of the process and research department.

In 1946 Bodle came to the Pritchard

Willamette Ships Vacuum Flasher Column To Shell

This vacuum-flasher column, manufactured by Willamette Iron & Steel Co. for Bechtel Corp., weighs 93,700 lb. Being loaded on a barge at Port of Portland docks, the vessel is destined for installation at Shell Oil Co.'s refinery at Anacortes, Wash.

Bring cuttings up FAST... by reverse circulation

with GUIBERSON

Type J ROTATING DRILLING HEAD

SLIPS, TABLE AND KELLY BUSHING
OIL RESISTANT PACKING RUBBER
POWER TAKE OFF
FULL FLOATING WASHPIPE
UNION OR FLANGE TYPE BOTTOM

Virtually a small rotary table, for work-overs, clean-out work, slim-hole drilling, or drilling in with controlled pressure, the Guiberson Type J Head offers you many exclusive features. It will drill cement plugs, float collars and new hole at an exceptionally fast rate.

BOTTOM CONNECTION	CASING SIZE
Union, Minor Hub with Two 2" Side Outlets	5½" 7"
Union, Standard Minor Hub	8⅝"
Flange, 6" — 600 6" — 900 Series	6"-7"

THE
GUIBERSON
CORPORATION

ESTABLISHED 1919 • DALLAS, TEXAS, U. S. A.

Sold By Leading Oil Field Supply Stores Everywhere

BUDA...Engine Builder for the Oil Industry

Announces 3 Great New TORQUE CONVERTER Packages!

8 MOS-1290 with Torque Converter
232 Torque Converter Horsepower at the Shaft
1290 cubic inch displacement
SUPERCHARGED
Natural Gas — Butane

6 MO-970 with Torque Converter
142 Torque Converter Horsepower at the Shaft
970 cubic inch displacement
Natural Gas — Butane

8 MO-1290 with Torque Converter
174 Torque Converter Horsepower at the Shaft
1290 cubic inch displacement
Natural Gas — Butane

Compact, Lightweight, High Speed Engine Torque Converter Units Deliver MORE USEABLE POWER and TORQUE for Drilling Operations

BUDA OILFIELD SERVICE EVERYWHERE

California
Anderson-DeVier Co., Inc.
Los Angeles, Bakersfield, Long Beach

Colorado
B. K. Sweeney Co.
Denver and Grand Junction

Indiana
Stone Industrial Power, Inc.
Indianapolis and Princeton

Kansas
Bell Engine Service
Great Bend

Louisiana
Mechanical Equipment Co., Inc.
New Orleans
W. L. Somner Co., Inc.
Shreveport

Michigan
Midway Tool Company
Saginaw

Mississippi
W. L. Somner Co., Inc.
Brookhaven and Tinsley

Missouri
Arrow Engine Sales & Service
St. Louis

New Mexico
Industrial Supply Co.
Albuquerque

New York (Export)
Buda Engine & Equipment Co., Inc.
New York City

Oklahoma
Buda Engine & Equipment Co.
Tulsa
Jennings Engine Service Co., Inc.
Oklahoma City
Power Transmission & Equipment Co.
Seminole

Pennsylvania
Brinker Supply Co.
Pittsburgh

Texas
Buda Engine & Equipment Co., Inc.
Dallas
Alice
Houston
Kilgore
Odessa
Wichita Falls
North Texas Buda Service
Pampa

Utah
Motor Mercantile Co.
Salt Lake City

Wyoming
Power Service Co.
Casper

Canada
Amco Equipment, Ltd.
Edmonton and Calgary

These three new Buda Torque Converter units are specifically designed for oilfield service. They give you *everything* you want in rig power — more delivered horsepower and torque per dollar . . . your choice of fuel — natural gas, butane or Diesel . . . less weight . . . more compact size . . . greater rig flexibility . . . smoother operation . . . faster acceleration plus the brute strength and stamina to stand up in toughest service.

Buda Torque Converter power is easier on your rig. Smooth, cushioned drive protects chains, transmissions, clutches, brakes, cable, drums . . . resulting in longer life and less downtime.

There's a lot more to be said for Buda Oilfield Torque Converter Power Units — and its all in your favor! Ask your Buda Oilfield Distributor for full details! Write for new Bulletin #1742.

A-C ALLIS-CHALMERS

BUDA DIVISION • HARVEY, ILLINOIS
ALLIS-CHALMERS MANUFACTURING COMPANY

organization as assistant manager of the Chemical Division. In 1949 he was promoted to manager of the process and research department.

Prior to joining Pritchard; Laughrey was chief of the process-design section for 5 years, at the United States Bureau of Mines fuels demonstration plant at Louisiana Mo., where he worked closely with the representatives of the National Petroleum Council in the design of commercial-sized Fischer-Tropsch and coal-hydrogenation synthetic-fuel plants.

Muldrow President Works With Calgary Office

M. E. MULDROW

M. Ellison Muldrow, president of Muldrow Aerial Surveys Corp., is in Calgary, Alta., for a month, working with the Calgary office of the firm.

The Muldrow company is moving a complete Canadian library, together with reproduction equipment and personnel, to Calgary to service the Canadian oil industry. Canadian offices were open to the oil industry on February 24 and 25, to demonstrate map-building and photographic techniques involved in map construction. Specialists from Midland, Tex., helping with this demonstration were T. L. Fuller, J. C. Fishel, T. L. Fishel, R. W. Hamlin, and O. De Santis. De Santis is a Canadian engineer and licensed dominion surveyor, who has been training in the Midland office for 6 months learning Muldrow techniques.

Stevens Promoted to Key Post By International

D. STEVENS

International Harvester Co. has named Donovan Stevens to be in charge of industrial power sales to national user accounts. He will work in the sales development section on sales to pipeline companies and other national buyers of International industrial-power products.

Stevens replaced Walter H. Tudor, who was appointed industrial power territory manager for the Chicago area.

Stevens, who took over his new duties in February, formerly handled engine sales to manufacturers.

Homco Holds Division Meeting In New Orleans

Louisiana division sales and service personnel attending the February meeting of Houston Oil Field Material Co., Inc., at New Orleans are, Seated: R. H. McClendon, district superintendent, Houma, La.; Linn Galeener, superintendent, directional drilling department; T. C. Smith, general superintendent services; George E. Justice, vice president, manufacture and services; George O'Leary, president, Homco; E. H. Robertson, executive vice president; Bob Duke, manager of sales, manufacture and services; Jimmy Erwin, division manager services, Louisiana and Mississippi.

Standing are: R. H. Robbins, electrical well-service sales representative, Louisiana division; T. C. Burke, division sales manager, Louisiana and Mississippi; J. E. Kerr, district superintendent, Mississippi; W. A. Carlton, district superintendent, New Iberia, La., Ralph Creager, district superintendent, Lake Charles, La., D. B. Allison, purchasing agent; Weldon Medders, chief engineer; L. F. Jeter, office manager, C. W. Speights, district superintendent, Harvey, La.; Lou Armstrong, directional drilling sales representative, Louisiana division; Al Eggleston, division manager, mud and chemical, Louisiana division; and Mack Standridge, assistant division manager, services.

Maintenance Engineering Names Two Sales Engineers

John J. Brennan and James J. Dillon have been appointed sales engineers for Chemical Division of Maintenance Engineering Corp., Houston, according to an announcement by C. E. Naylor, chairman of the board.

J. J. DILLON

J. J. BRENNAN

Before becoming associated with Maintenance Engineering, Brennan was with National Aluminate Corp., Chicago. He came to Houston in 1952 for Aluminate in the capacity of water-treating and sales engineer.

For a year, prior to joining Maintenance Engineering, Dillon was associated with the Board of Water Engineers in Austin.

Republic Supply Opens Medicine Lodge Store

A new store was opened by Republic Supply Co. at Medicine Lodge, Kans., in February, according to an announcement by M. N. Amsden, vice president and general sales manager of the Oklahoma City oil-field supply company.

Marion C. Tener, formerly a field salesman for Republic in the Ellinwood, Kans., store, was named manager of the new store, and Richard Wells, field representative in the Ellinwood store was transferred to Medicine Lodge and promoted to sales representative.

Tener joined Republic Supply in 1952, having had many years' experience in the oil-field supply business prior to that date.

In addition to the new store, Republic Supply now has 43 stores and 12 sales offices in 9 states. Organized in 1910, the company now has stores in practically every major pool in the Mid-Continent and Gulf Coast location.

W. L. Somner Opens Store At West Bridgehead, La.

W. L. Somner Co., Inc., Shreveport, La., has announced the opening of a new store in West Bridgehead, New Orleans.

Johnnie Beeson, who has been associated with the company since 1946, has been named district manager for this area. The new store will offer sales, service, and a complete stock of Gaso pumps and parts.

Food Machinery Enters Agreement With Chiksan

Food Machinery & Chemical Corp. has entered into an agreement with Chiksan Co. whereby it will offer to exchange one share of Food Machinery & Chemical common stock for 2.30 shares of Chiksan common stock of which there are 260,264 shares outstanding. This announcement was made jointly by Ben C. Carter, Food Machinery & Chemical executive vice pres-

Better than good—this pair is the best!

NO-GALL or LO-TORK Compounds give threads on tool joints and drill collars the best protection money can buy. They do this by minimizing friction—maximizing gall resistance. They spread easily, uniformly—never gum up or squeeze out. They lubricate without freezing—permit fast break-out on string after string of drill pipe.

It's just sound economics to insist on the best compound you can buy. It means longer life for tool joints, less down time, money saved. Next job insist on the BEST—insist on either WECO NO-GALL or LO-TORK Compounds. Available at supply stores everywhere.

PESA

C1-55

it's wise to standardize with.. WECO

WECO

WELL EQUIPMENT MFG. CORP. • Division of Chiksan Company • HOUSTON 1, TEXAS

ident in charge of machinery divisions, and H. J. Hagn, president of Chiksan.

Chiksan is a manufacturer of specialized pressure-type swivel joints and wing-nut unions for use in the petroleum industry and other industrial applications where flexible lines are required in handling or transferring fluids or air. The company was incorporated in California in 1939, succeeding Chiksan Oil Tool Co. formed in 1928.

Present operations encompass the main plant and headquarters at Brea, Calif., and Well Equipment Manufacturing Corp. (Weco Division) at Houston.

It was indicated that the acquisition will substantially broaden Food Machinery & Chemical's current position as a producer of equipment and materials for the petroleum industry and other specialized industrial fields. The new operation will function under its present management as Chiksan Division of Food Machinery & Chemical.

Malcom Is General Manager Of Perrault Equipment Co.

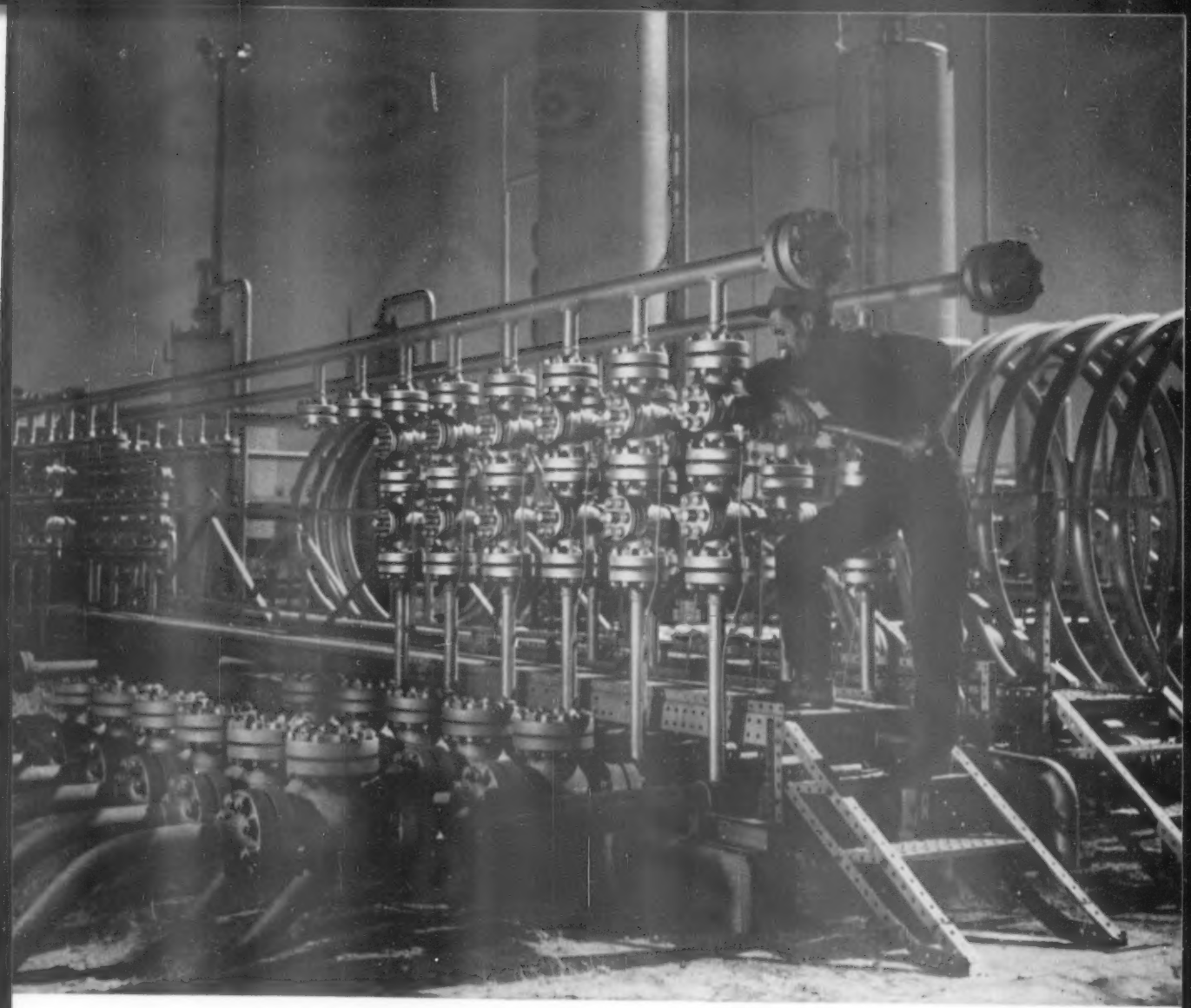
V. V. Malcom, formerly sales manager of Philip Carey Manufacturing Co., Cincinnati, has been appointed vice president and general manager of Perrault Equipment Co., a pipeline equipment and supply firm, effective March 1, it has been announced by W. O. Dixon, owner of Perrault Equipment Co.

Malcom, an engineer by training, joined the Carey firm as a field engineer in 1927 and served it continuously in various capacities until the present change. He was closely associated with pipeline construction throughout this period, having designed, manufactured, and marketed a number of materials which are commonly used in the business.

Clear Span Announces Election of Officers

Clear Span Engineering Co., Houston, has announced the election of new officers. The announcement was made by Weldon F. Appelt, who has been elected president and treasurer. Dr. W. P. Bonin and L. F. Corwin were chosen as vice presidents. Miss Julie McDonald was elected secretary. Corwin was also given the responsibility for the company's new branch office in Washington, D. C.

Clear Span Engineering is gaining recognition in the pipeline and oil in-



Profit-Making

Lubricating a Rockwell-Nordstrom valve periodically is not just another maintenance item; it's a profit-making investment in low-cost operation. The advantages are the same as those you get from lubricating your automobile engine: increased efficiency and longer life at lower end-cost.

Rockwell-Nordstrom lubrication saves you money in three important ways: 1. eliminates wear of metal-to-metal friction; 2. provides a constantly renewed seat for leak proof sealing; 3. allows the plug to be hydraulically jacked for instant operation when necessary.

Today's Rockwell-Nordstrom quality is the result of forty years of leadership in building the most complete line of lubricated plug valves and plug valve lubricants in the world. Why not use that unequaled experience to cut *your* valving costs! Rockwell Manufacturing Company, Pittsburgh 8, Pa.

ROCKWELL-Nordstrom VALVES

LUBRICANT SEALED FOR POSITIVE SHUT-OFF

Put New Profits in Production

Is controlling the flow of liquids, solids, gases or slurries part of your production problem? Rockwell-Nordstrom valves will do a *better* job —at lower cost—than any other valve you've ever tried.

Pressure lubrication that forms the leak proof seal in Rockwell-Nordstrom valves has the same importance whether your flow problem is cement slurries or light hydrocarbon gases. Quarter turn operation gives you precision control whether you're batching chemicals or measuring fuel. And tough lubricant film protection of metal working surfaces, plus unexposed seating areas, means longer valve life whether your lines carry pulp liquors or synthetic rubber.

You can't buy a more dependable, more efficient valve than Rockwell-Nordstrom—or one that will cost you less to use. Write for complete information today. Rockwell Manufacturing Company, Pittsburgh 8, Pa.

ROCKWELL-Nordstrom VALVES

LUBRICANT SEALED FOR POSITIVE SHUT-OFF

Meet your **production**

EQUIPMENT SPECIALISTS

in South Texas

When you need equipment for your next well, call your Union Tank sales and service man. DAY OR NIGHT, his years of experience are available to help you solve the production equipment problems on your leases. This service, combined with dependable Union Tank production equipment means a more profitable operation to you. That's why it will pay you to know the following men:

C.W."Dinky" Price
Branch Manager

N. O. Adams, Jr.

Henry Barnes

B. R. Blount

George Frank

J. R. Holmes

Union Tank's Alice, Texas office
Phone 4-6503 or 4-6504. P. O. Box 269

When your next well comes in, call Union Tank for fast, skillful service with dependable follow up on . . .

Welded steel tanks
Bolted steel tanks
Wood tanks
Stairways, walkways
Texsteam pumps
Vertical separators
Horizontal separators
Indirect heaters
Emulsion heaters
Heater tanks
Heater-treaters
Cold sep. & dehyd. units
Valves and regulators
Loading racks

UNION TANK AND SUPPLY COMPANY

P. O. Box 2092, Houston, Texas

Subsidiary of Butler Manufacturing Company
Kansas City, Missouri

dustries. Its economical bridge designs are becoming important in the building of pipelines. In the oil industry, Clear Span's box-griver-type bridge has made possible the construction of bridges capable of bearing great loads in inaccessible locations at lower costs.

Oilwell Names Buchanan Store Manager at Carmi

Appointment of Clarence I. Buchanan as store manager of the U.S. Steel Oil Well Supply Division store at Carmi, Ill., has been announced recently by C. H. Maynard, eastern area manager for Oilwell.

Buchanan entered the employ of Oilwell in 1948 at the division's Bridgeport, Ill., store. In 1952 he was transferred to the Oilwell store at Carmi.

Lane-Wells Office Opened In Downtown Oklahoma City

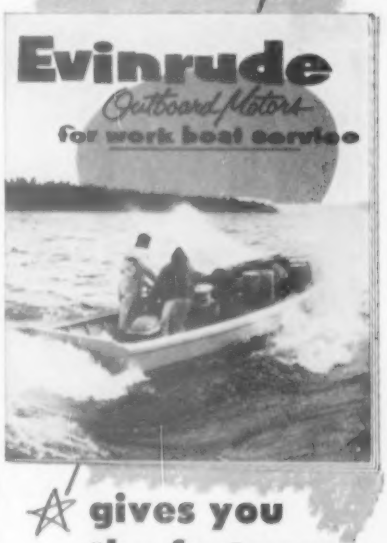
A new Lane-Wells division sales office has been opened in downtown Oklahoma City, in the Liberty National Bank Building, according to R. B. Downing, Mid-Continent division manager. The new office will be staffed by J. M. Terry and Robert L. Gregg, Jr., division sales engineers. Lane-Wells now has more than 31 branches in the six districts of the Mid-Continent division.

Well Equipment Shifts Brien to Industrial Sales

Willard H. Brien, who has been general oil-field sales representative for Weil Equipment Manufacturing Corp. in the Houston area for the past 5 years, is being transferred to industrial sales in the Gulf Coast area. In his new job, Brien will contact refineries, chemical and petroleum plants, engineering firms, contractors, and other industrial plants as representative for both Weco and Chiksan products.

The transfer of Brien to this field of activities enables both companies to render better sales and engineering service to refineries and chemical plants on the Gulf Coast, many of which require special types of equipment and special corrosive-resistant materials. Brien, who has been with Weco for 6 years, will continue to make his headquarters at the Weco home office in Houston.

new book



gives you the facts on

modern
OUTBOARD POWER
for
oil field
service

TODAY there's a *new kind* of outboard power for work boat duty! A complete line of new Evinrude *Aquasonic* models so advanced in capability, stamina, and smooth, quiet operation that they set entirely new standards of performance. Get the facts! Send coupon for booklet.

EVINRUDE MOTORS
Division of Outboard, Marine & Mfg. Co.
4632 N. 27th Street, Milwaukee 16, Wisconsin

Send me booklet on outboard power for work boat duty.

Name.....

Address.....

City.....Zone...State.....

(In Canada: Mfd. by Evinrude Motors of Canada, Peterborough)

For Directional Drilling . . . it's

HOMCO

HOUSTON OIL FIELD MATERIAL COMPANY, INC.

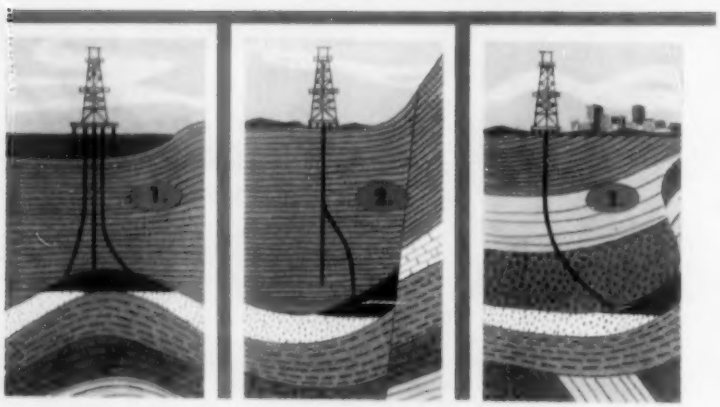
Anywhere • Any place • Any time

— with the background of more than twenty-five years experience and the best trained engineers in the directional drilling field.

Homco offers the latest tools, instruments and methods for directional drilling and well surveying. Homco maintains service locations in all oil producing areas and has experienced directional drilling engineers ready to serve you twenty-four hours a day.

Planned directional drilling proposals are made in advance of any directional drilling operation by well qualified, experienced Homco engineers. All recommendations and suggestions made to the oil operator are based on more than twenty-five years experience in directional drilling operations in oil producing areas throughout the world.

Consult one of the 33 strategically located Homco offices for additional information.



SIDETRACKING
STRAIGHTENING
SURVEYING

1. Drilling multiple wells from offshore installation.
2. Straightening or sidetracking.
3. Drilling under townsites or cities to reach an oil reserve.

OIL INDUSTRY'S MOST *Complete* SERVICE

With service points in the United States at:
TEXAS: Houston, Beaumont, Bay City, Victoria, Corpus Christi, Alice, Kenedy, Pearsall, Freer, Edinburg, Sullivan City, Dallas, Fort Worth, San Antonio, Midland, Odessa, Snyder. LOUISIANA: Lake Charles, New Iberia, Houma, Harvey, New Orleans. MISSISSIPPI: Brookhaven. NEW MEXICO: Hobbs, Lovington, Farmington. OKLAHOMA: Tulsa. COLORADO: Denver. WYOMING: Casper. NORTH DAKOTA: Williston. CALIFORNIA: Long Beach, Bakersfield, Ventura. General Offices, Manufacturing and Export Division, Houston, Texas.

- DIRECTIONAL DRILLING
- FISHING OR CUTTING
- OIL FIELD SUPPLIES

HOMCO

HOUSTON OIL FIELD MATERIAL COMPANY, Inc.

HOUSTON, TEXAS

EXPLORATION

Maps for Modest Budgets

by Frank J. Gardner

NO oil man worth his salt would be caught without a map. It's as essential as his watch, his wife, or his wallet. It may be the latest on linen, the oldest on parchment, or just a sketch on a paper napkin, but it's a map.

The kind of dream map that most oil finders visualize is an expensive item. And it's beyond the reach of most independent operators. But a group of Gulf Coast operators, pooling their resources, have done something about it. A fascinating project is under way there that might well set a precedent for oil men in other parts of the country. It has to do with maps. Regional contoured maps.

Cooperative effort . . . Oil and gas are getting harder to find in the Gulf Coast, as in many other regions, and the independents' old "go-it-alone" policy is harder to pursue. But the growing trend toward group effort has shown the way to new economies and efficiencies, and this new map project is one of those efforts.

The idea was born in Houston in 1952, in the mind of an independent oil man. As a geologist, and as an independent, he realized the need of small operators for more ambitious map facilities than the average budget provides. So he decided to do something about it.

Why not a map cooperative, modeled along the lines of some commercial map makers who permit "trade-ins" of old maps for new? Except that this map would be different. It would cover an entire region, and it would be contoured on one of the chief producing formations of that region. As it got old and out of date, it could be traded in for a new model, showing new wells and changed concepts of the subsurface that might result from new drilling. It would be broad in its coverage, revealing in its makeup, and detailed in its accuracy.

And ambitious planning . . . The plan was, through joint financial effort, to secure for the independent producer a subsurface map similar to those used by major companies in evaluating submittals and broad planning of exploration effort. The cost of building and maintaining such a map would be excessive for any one producer, but on a cost-sharing basis with 10 or 12 others, the expense would be nominal. It was an ambitious plan, and it was beset with many problems, but diligence and persistence have paid off with not one, but three such maps, and a fourth one under way.

The group operates under the guidance of an energetic young geologist who is going to reveal some of his discovery thinking to Journal readers in a major article on April 4. It has finished two maps on the Frio subsurface, an "east half" and a "west half"; these are built on a scale of 1 in. to the mile. In addition, there is a third map drawn on the Yegua and Wilcox tops, on a scale of 1 in. to 10,000 ft. The maps are contoured on electrical-log correlations. Points are picked on each log, and faulting is indicated wherever it is identifiable. The primary effort is directed at regional subsurface interpretation, but individual field structure also is shown, based on the most widely accepted ideas of structure in the particular field concerned.

A greatly reduced portion of the regional subsurface Gulf Coast map, contoured on top of the Frio formation. (Courtesy Coastal Geological Service, Esperson Building, Houston.)

New Maps for Old

When an operator wants to get a new map, he must turn in his old one for burning. A new one is then prepared for him. The map base, well names and spots, total depths and elevations are carried on a master positive; well data and contours are on an acetate overlay to facilitate the constant changes and revisions in interpretation. The positive and overlay are brought to register in a vacuum frame to make a new negative. From this the revised print is made.

The trade-in privilege enables the subscribing clients in the group to have continuous subsurface coverage with no effort and small expense. Renewals are provided on a terminable monthly fee basis, although the usual trade-in period is quarterly. New clients can come in from time to time, but the tight little circle is restricted to actual oil producers interested in a bona fide search for new oil.

Ease the effort . . . The next step is to move eastward to construct similar maps on the subsurface of coastal Louisiana. Contouring of the western half is now in progress, and as the coverage grows, the discovery effort for the "little man" will be eased.

Here again is the new broad view in exploration—and another example of the ingenuity displayed by our independent producers when the going gets tough in an old, developed region. They have to scratch to find the oil, but scratching together lightens the task.

$2,000,000,000 Worth of Seismic Records

. . . is the U.S. oil industry making the most of this investment?

by H. B. Peacock

Definitely not, says the author of this S.E.G. paper. Here, in a nutshell, are his reasons for not thinking so:

1. Not enough has been done in reviewing seismic-data files to either apply new interpretations to old records or to find the cause of inconsistencies between original interpretation and later well experience.

2. There hasn't been enough coordination between geologists and geophysicists in resolving differences between seismic data and well data on active wells.

3. There's too little swapping of seismic data among oil companies—the sort of swapping that today is being carried out so successfully with such well data as electric logs.

THE stored seismic records on the shelves of oil companies represent an enormous investment. It is estimated at 2 billion dollars in the United States alone.

This investment is now increasing at an estimated annual rate of 130 million dollars. In addition, storing and handling charges continue to mount. Neglect of such an investment in any other field would be disastrous.

If this mass of seismic records is to be of greatest use, it must be kept alive by continued review and study under some such program as outlined by Alcock.[1] The main objectives of such a program were stated as follows:

1. To review and submit an independent interpretation of current seismic data.
2. To review old seismic data in the light of new geological developments.
3. To compile and prepare regional seismic maps.
4. To investigate areas in which seismic and geological data do not conform.

These objectives are still quite pertinent and are quoted in full because this is a subject which needs reiteration.

Reviewing seismic data . . . Most oil companies today probably have review departments with widely varying degrees of completeness. Some have only one man. Others have very elaborate staffs. Other companies have availed themselves of the services of one or more of the many contracting companies for specific jobs in areas of special interest.

Undoubtedly, a large volume of records remain which have not been looked at since they were filed away. Perhaps many of these are completely outmoded—both in record quality and in shooting technique—and should remain in dead storage or be turned over to educational institutions for training purposes. Others, however, may contain some structural indication which might lead to the discovery of an oil field.

Perhaps the most fundamental reason for review and continued review of seismic records lies in the impossibility of portraying on contour maps or even on cross-sections, all of the data contained in the records themselves. If the records are properly interpreted on the cross-sections, which is quite often not the case, the review may be largely a matter of searching for the answer to some specific problem, such as faulting, which may be indicated by drilling.

One of the more specific objectives of review work today should be the search for prospects of interest which might warrant further investigation. There is always a shortage of worthy prospects for shooting and for drilling. Geologists are continually reworking their well logs in areas of interest and fitting new logs into their structural pictures in the hope of finding a worthwhile prospect or of solving some structural problem. In the same manner, seismic data should be reviewed in the light of new developments and fitted into the over-all picture.

If oil companies have delayed this phase of seismic work for lack of personnel, now might be a good time to consider working off some of the backlog because there are qualified men available in the contract field. This might be done by contract or by hiring the men outright. There are probably many experienced men whose children are now of school age who would welcome an opportunity to get out of active field work and to settle in one location.

Deeper pays . . . Mapping of deeper horizons should be another special objective since production is being pushed to ever greater and greater depths. Many of the older records do not show the deeper reflections satisfactorily for mapping. But generally, a few records may penetrate deep enough to give a structural lead of significance.

In view of the trend toward deeper mapping, it is rather surprising to find on a recent survey in South Louisiana that many of the deeper reflections were not plotted on the cross-sections. These same records were cut off at a time of about 4 seconds, even though reflection amplitudes persisted and it was possible to trace some fairly reliable reflections to the ends of the records.

In general, far too little care has been taken in interpreting the deeper reflections and in obtaining them in the field.

Faulting . . . Special problem areas are continually with us. The reflections may be very poor or they may be of fair quality, yet a positive solution is evasive. In some areas, faulting has often become a catch basin for such difficulties, possibly with increasingly good reason since more and more new wells show evidence of faulting.

In regions of the more recent sediments, detection of faults is often difficult at best. The value of an independent interpretation in such situations should not be overlooked. Many times an interpreter with a different viewpoint and possibly with different meth-

Author is a consulting geophysicist, Dallas.
From a paper originally presented at the eighth annual midwestern meeting of the Society of Exploration Geophysicists, Dallas, November 18-19, 1954.

TOOL JOINT HARD-FACING ON BARGE

Pipe Handling Simplified with Common Tools

In the field or the storage yard where pipe racks are available, tool joint rebuilding and hard-facing offer no particular problem. But aboard a drilling barge on the Louisiana bayous—that's a different story. Dewey Hester, working out of his shop in Houma, La., has found a way to beat the tight quarters, lack of pipe handling equipment and conventional turning devices that he has to put up with on the floating rig. Here's how he "makes do" with the simplest of tools.

With nothing more than a pair of pinch bars and a large pipe wrench, Mr. Hester can position, rotate and hard-face three 6" tool joints in a little over an hour. The pictures tell the story.

Of course, he is just as shrewd in the selection of his hard-facing alloys as in his pipe handling—he uses Stoody 20-30 mesh Acetylene Tube Borium for maximum tool joint life and economy.

(Want a copy of the Stoody Oil Field Hard-Facing Book? It's yours for the asking. See your Stoody dealer or write the company.)

Pipe rests on inclined pinch bar blocked up on outer end. Second bar is wedged at angle to form a "V" type cradle.

A line chalked around joint indicates upper limit for hard-facing application.

Vigorous wire brushing cleanses surface of joint thoroughly before hard-facing.

Pinch bars provide the leverage for shifting heavy lengths of drill pipe in position for hard-facing.

With joint firmly cradled against "walking," Stoody Acetylene Tube Borium is applied and joint rotated as required with pipe wrench.

STOODY COMPANY

11938 East Slauson Avenue
Whittier, California

ods may offer a more logical solution. Trace-by-trace plotting of cross-sections is being used by some companies as standard procedure and should be especially worthwhile in such areas. At any rate, this appears to be the ultimate in interpretation procedure.

In the matter of faulting, recent talks by Quarles on diffraction have somewhat upset our thinking that faulting should result in a more or less definite break in the continuity of a reflecting horizon. His theory is that under certain unpredictable circumstances, diffraction may tend to carry reflections across a fault, giving evidence of faulting only by steepening of the rate of dip. Probably all of us can recall instances where such evidence was interpreted as denying the presence of faulting or as indicating faulting in a different location.

Without detracting from Quarles' theory or his evidence, I am sure we all anxiously await publication of his paper and, if possible, further proof as to the existence and location of the fault on the records exhibited. It would be very worthwhile for each of us to try to recall similar situations to test this theory.

Coordinate geology and geophysics . . . Too much stress cannot be placed on the importance of resolving differences between seismic data and well data. This is important on two counts. First, from the standpoint of structural information. And second, from the standpoint of learning how to interpret similar situations in the future.

This empirical approach to interpretation problems is too often neglected, especially among contract companies. Quite often, the party chief or the supervisor responsible for the original interpretation may not be available after a well is drilled and the checkup is neglected. Contractors might find it worthwhile to pay closer attention to this matter from a training standpoint alone, to say nothing of the benefit from client relations.

In many cases, reasons for errors in interpretation between wells are easily found. The reflections may be poor and alternate interpretations may be quite possible. On the other hand, there are cases where the reflections are apparently continuous, yet the seismic data fail to fit the well data. In such cases, weathering calculations, topographic corrections, and even the depth calculations themselves may be based on erroneous assumptions as to the velocities involved. Either the near-surface velocities or the over-all velocity to the reflecting horizon may vary between the wells. This is often an insoluble problem from ordinary seismic records alone. But recognition of the problem is of value and should be checked at every opportunity as additional wells are drilled and as new velocity surveys become available.

Swapping seismic data . . . It would be a great step toward maximum use of seismic data if some fair method could be worked out for the exchange of seismic records similar to the exchange of well logs and of well-velocity data. It is difficult to imagine the situation which would exist if oil companies did not permit sale or exchange of well logs. If this were not the case, duplicate wells might be drilled merely for structural information.

This sounds unreasonable, yet it is often done on a smaller scale in core drilling. And, in effect, it is regularly done in seismic work. We think nothing of reshooting prospects time after time. Yet the cost as compared with a well is sometimes not too greatly out of proportion.

It is interesting to note that within the past year some progress has been made in the matter of exchange of seismic records. One company has been formed for the purpose of setting up a record library. Copies of records on a given area, if available, may be obtained by exchanging other records for them plus a fee for reproduction and handling. Just as in the case of well logs, the interpretation is left to the company making the exchange.

In such a competitive business as the oil industry, it may be too much to hope that full cooperation in any such exchange of seismic records can be expected among all the oil companies. Such exchange may only come about when it becomes more important to find oil than it is for a particular company to find it. However, it hasn't been too many years since electric logs were very reluctantly released or not released for several years. At the present time the vast majority of electric logs are released within a year or two.

Attitudes do change with time. Consequently, it may not be too early to suggest the need for greater uniformity in the details of obtaining seismic records.

It is surprising how many records lack essential information for rigorous reanalysis. For example, take the matter of trace by trace plotting of reflection data mentioned above. Such procedure requires weathering and elevation control for each trace. Yet perhaps the majority of surveys even today do not show distances and elevations accurately enough for such calculations. It is not sufficient to show on the record label "Spread 1500-0-1500," especially if the instrument spread happens to be crooked.

An increasing spirit of cooperation in the geophysical field is quite apparent in the past several years. This is exemplified by the character of many of the technical papers appearing in Geophysics. It is also evident in the well-shooting associations where a considerable degree of uniformity in procedure as well as in method of presentation of the data has been accomplished. The committee on definition of technical terms and the safety program developed under the guidance of S.E.G. are other examples of cooperation. It is suggested that efforts be made to set standards and minimum requirements in seismic work. This might be a step in the right direction.

Reference

1. Alcock, E. D., The Review and Analysis of Seismic Data, Geophysics, Vol. 10, pp. 338-344, 1954.

EXPLORATION HIGHLIGHTS

MID-CONTINENT

KANSAS

Sharon Field Opened In Barber County

Sharon pool has been opened officially in Barber County at Aurora Gasoline-Jones, Shelburne & Farmer, Inc. 1 McKeever, SE SE SE 13-32s-10w.

The discovery well of the new field is producing from perforations in the Mississippian at 4,355-65 ft. It is rated for 40 bbl. of oil per day. The discovery is 4 miles east of the town of Sharon, Kans. The field has a new location announced at Durbin Bond & Co. 1 McKeever, SE SW SE 13-32s-10w. This well is ¼ mile west of the field opener.

Promising Discovery Seen For Graham County Area

Graham County has a good oil prospect in the making at Brooks Hall and Benson-Montain 1 Huntington, SE SE SW 7-7s-25w.

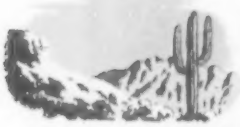
Recovery on a drill-stem test in the Lansing at 3,688-3,715 ft. was 1,320 ft. of gas and 1,880 ft. of oil. Another test at 3,726-60 ft. got 200 ft. of gas, 1,140 ft. of oil and 300 ft. salt water. The wildcat is in the northwest

In Seismic Exploration

TYPE OF EQUIPMENT is Important

MOUNTAIN

PLAIN



DESERT

SWAMP

To assure *efficient geophysical service*, SSC uses a wide variety of field equipment. This equipment is "tailored" to fit the specific problems of the area, and includes:

8 types of conventional **Geophones**

5 types of **Well Geophones**

5 types of **Geophone Cables**

7 types of **Amplifiers**

5 types of **Cameras**

3 types of **Play-back Recording Systems**

two of which are magnetic

7 types of **Shot Hole Drills**

5 types of **Water Tenders**

4 types of **Shooting Units**

In design, this equipment ranges from "back-pack" to "Track-mounted" units.

Increase the effectiveness and efficiency of your Seismic Exploration with instruments and equipment "tailored" to your requirements — Call, wire or write SSC — today!

SEISMIC SURVEYS — GRAVITY SURVEYS — PILOT CREWS — LORAC — VELOCITY LOGGING

Seismograph Service Corporation

TULSA, OKLAHOMA, U.S.A.

WORLD-WIDE EXPERIENCE

Spanish Pipeline Terminal Fuel Storage Tank Farms

Advertisement for Bids

Brown-Raymond-Walsh, the Prime Contractors for the construction of United States Military Facilities in Spain, hereby solicits bids for the furnishing and erection of Pipeline Terminal Fuel Storage Tanks to be constructed at East Rota, Sevilla, Madrid and Zaragoza. This construction work will include the necessary excavation, concrete foundations, welding, painting and testing of 47 underground steel storage tanks.

The plans and specifications now being prepared will cover the construction of sixteen 80,000 barrels tanks, twenty-one 50,000 barrel tanks, six 13,500 barrel tanks, and four 7,500 barrel tanks. The approximate quantities involved in this construction are as follows: excavation—1,200,000 cubic yards; reinforced concrete foundations—45,000 cubic yards; steel tanks, furnished and erected—19,000 tons.

Bids will be considered only from Spanish-American joint venture organizations which are composed of at least one established Spanish construction company and at least one established American tank erection firm whose combined firms can meet the following conditions:

(a) They must furnish satisfactory evidence that they have completed similar projects recently. As a consideration of award, bidders will submit statements to the Prime Contractor showing the volume of similar work they have done in the past three years, by years, listing the amount of each contract, where constructed, the owner, size and number of storage tanks, and time consumed in completing the projects.

(b) They must be able to supply from within their own organizations experienced managerial and technical personnel.

(c) The joint venture will be required to complete the work within 550 days from the date they receive the notice to proceed.

(d) Certified financial statements will be required by the Prime Contractor as proof of the capability of the low bidder to finance mobilization of the job and all construction expense above current payments.

The joint venture will be required to furnish all equipment, material and supplies required to complete the erection of the tanks in accordance with the specifications. This equipment, material and supplies will be allowed to enter Spain duty-free provided it is guaranteed that the equipment and materials not consumed in the completion of the work will be removed from Spain upon completion of the project. The Prime Contractor will furnish at nominal rental rates equipment required to perform the excavation, concreting, and back fill.

Payment for the work will be made in both pesetas and U. S. dollars. For comparison of bid purposes only the rate of exchange will be fixed at forty three pesetas to one U. S. Dollar.

Sealed bids, endorsed "Bid for Terminal Storage POL," will be received until 6:00 p.m., Wednesday, May 4th, 1955, at the offices of Brown-Raymond-Walsh, 3rd floor, Edificio Espana, Madrid, and at that time publicly opened.

Bids will be accompanied by a provisional bid bond in the form of a Bank Draft or Certified Check for not less than one hundred fifty thousand dollars ($150,000) or six million four hundred fifty thousand pesetas (6,450,000 pesetas) to guarantee the signing of the contract. Upon execution of the contract document all provisional bid bonds will be returned. At the same time, bidders must submit a performance bond, face value fifty million pesetas (50,000,000 pesetas), in the form of a guarantee by an acceptable Spanish bank that work will be performed in accordance with plans and specifications and that all obligations of the contract will be satisfied.

"Approved for Construction" drawings, specifications and other bidding information may be obtained April 5th and thereafter upon application to the offices of Brown-Raymond-Walsh, in Madrid. Deposit of Certified Check, in the amount of two thousand pesetas (2,000 pesetas) payable to the account of Brown-Raymond-Walsh will be required as security for the safe return of each set of the bidding data.

YOU CAN SEE ALL THE WAY DOWN WITH

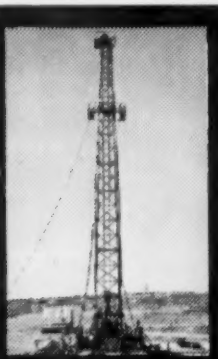
GEOLOGRAPH

Yes—on shallow or the deepest wells . . . Geograph lets you see formation changes *as you drill!* There's no need to drill in the *dark* when you use Geograph!

GEOLOGRAPH
MECHANICAL WELL LOGGING SERVICE
P. O. BOX 1291 • OKLAHOMA CITY 1, OKLAHOMA

GEOLOGRAPH TIME WILL TELL

Farmington, New Mex. • Liberal, Kan. • Oklahoma City, Okla. Bakersfield, Cal. • Abilene, Houston, Odessa, Lubbock and Wichita Falls, Tex. • Shreveport, and Baton Rouge, La. • Casper, Wyo. Glendive, Mont. • Sterling, Colo. • Edmonton and Regina



2 COMPLETE DRILL RIGS
Trucks—Drill Equipment
Industrial Real Estate

$712,629.66 Evaluation
By order of the Board of Directors
BUAAS DRILLING CORP.
3915 Rosedale Highway
BAKERSFIELD, CALIF.
120 miles North of Los Angeles
TUES. MARCH 22nd, 11 A.M.

PUBLIC AUCTION

All will be sold piece-meal or in units to suit bidders.

IDECO #525 RIG — Ideco #525 Double Drum Draw Works, completely unitized w/ 2 GMC 4-cyl. Twin Diesel Engines w/ GM Torque Converters, Hydratarter Brake, Friction brakeout & spinning cat heads & 2 air starters; **Ideal C 250 Mud Pump** 7½ x 15 driven by set of Twin GMC Diesels w/ Air Starter and Single GMC 671 engine. Complete; **127 Ft. Bender Guyless Steel Mast; 8 x 20 x 4 Mud Tank,** 40 KW Light Plant; Westinghouse 3YC Compressor; 185 Joints Range 2 4½" Drill Pipe. Rig is fully complete with all accessories, etc.

IDECO #M10,000 RIG — Ideco M 10,000 Draw Works, fully unitized w/ 3 Sets GMC 671 Twin Diesel Engines, 2 Air Starters, American Breaking Cathead, Foster Junior Spinning Cathead, Parkersburg 36" Hydramatic Break, etc. **Clark Triplex Mud Pump** 7¼ x 12 w/ 2 Twin 6 GMC Diesels; Mud Storage Tanks; 2300 Gal. Diesel Fuel Tanks; GMC 40 KW Generator; 2 Westinghouse 3YC Compressors; 133 Joints 4¼" and 87 Joints 3½" Range 2 Drill Pipe and all attachments for rig. **Also 2 Mack 6** Gasoline driven Trucks, Rolling Stock, Misc. Yard equipment; 5 A. of **Bakersfield Industrial Real Estate.**

Send for Free Illustrated Brochure

MAX ROUSE & SONS
AUCTIONEERS—Established 1920
1710 W. Adams Blvd., Los Angeles, Calif.
RE. 1-8421

part of the county, 7 miles northwest of Schmied field production.

Barton County . . . Thunderbird Drilling Co. has cemented pipe at 3,471 ft. at 1 Kimpler, SE NE SE 31-18s-11w. A drill-stem test in the Arbuckle got 1,590 ft. of oil. This prospective strike is between Weikert and St. Peter pool production.

New Bulletin Published By State Geological Survey

"The Geology of The Norton Oil Field, Norton County, Kansas," by Daniel F. Merriam and Edwin D. Goebel, was recently published by the State Geological Survey of Kansas, Bulletin 109, Part 9, a University of Kansas Publication, Lawrence.

The field was opened in 1953 about 6 miles southwest of Norton. There were 97 producing wells up to August 1954. The report contains four structure maps of the field.

OKLAHOMA

North Madill Pool Extended In Marshall

Sinclair Oil & Gas Co. has completed the 1 Little in SE NW SE 15-5s-5e, as a ¾-mile southeast extension to Marshall County's important North Madill field.

The discovery well is also a new pay strike for the pool. The well flowed 995 bbl. of 38.2°-gravity oil natural in 24 hours through ¾-in. choke. Pay is the second and third Bromide sands through perforations between 6,138 and 6,303 ft. Gas-oil ratio was 577:1 with gas volume gaged at 574 M.c.f. per day. A discovery allowable of 150 bbl. per day for 15 days has been granted. The discovery well of this field, the 1 Griffin, was completed in the McLish sand.

Sinclair's 1 Nunley, SE NW NW 15-5s-5e, found the Bromide sand at 5,662 ft. and is drilling at 5,774 ft. Buffalo Oil Co. is testing basal McLish perforations at 6,012-44 ft. at 1 Olmsted, NE SW NE 16-5s-5e, southwest of the 1 Griffin discovery well in SE NE NE 16.

North Wellston Discovery Completed In Marshall Sand

A new-pay discovery for the abandoned North Wellston field in Lincoln County has been completed at Frankfort Oil Co. 1 Erwin, SW SW 35-15n-3e. This well flowed oil at an initial flow of 100 bbl. in 5 hours on 16/64-in. choke from perforations at 5,152-64 ft. in the Marshall sand.

Second Wilcox Strike Finaled East of Norman

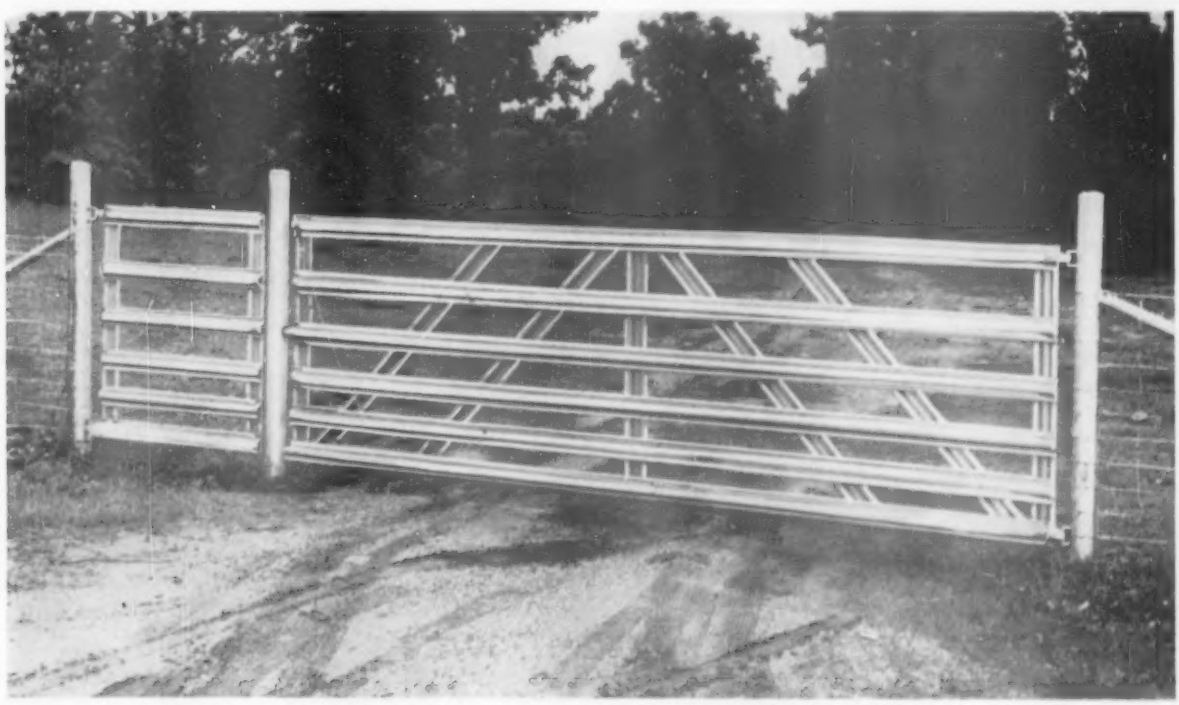
Ohio Oil Co. has reported completion tests at 1 Heims, NW SW NE 27-9n-1w, second Wilcox discovery east of Norman in Cleveland County.

The well flowed 234 bbl. of 35°-gravity oil per day on 9/32-in. choke natural from the open hole interval 6,982-98 ft. This well is southeast of Northeast Falls pool.

Murray County Discovery Has Improved Its Prospects

Frankfort Oil Co.'s 1 Sam, SW NE 4-1s-1e, important Murray County discovery on the north side of the Arbuckle Mountains, has improved its prospects on basis of a recent drill-stem test.

The well found the dense phase of the Arbuckle at 5,800 ft. and got commercial porosity at about 6,734 ft. Recovery of the drill-stem test at 6,896-6,934 ft. was 5,580 ft. of 42°-gravity oil with 210 ft. of heavily oil-cut mud. Earlier tests in the upper part of the



"LIFE-TIME" GATES — FOUR AND FOURTEEN FOOT SIX PANEL B-E-A-U-T-I-E-S
GIVE THAT MILLION DOLLAR LOOK TO YOUR PLACE. SEE YOUR LOCAL DEALER—

The owner of this FARM or RANCH was glad to sign the Easement when told that a shiny "Life-Time" Aluminum Gate would fill the gap. Ten factories in the U.S.A. and one in Canada. Main office: ALPRODCO, INC., Mineral Wells, Texas.

zone showed free oil. Recoveries were 200 ft. of clean oil to 400 ft. of oil. More than 100 ft. of effective pay has been penetrated from 6,734-6,934 ft.

The wildcat is on a prominent zone of faulting that trends northwest-southeast. More well control is necessary to establish the fault plane in the immediate area. The 1 Baldwin has been staked to test the Arbuckle in SE NW NE 4-1s-1e.

Second Pay Seen for Garvin County Wildcat

A second pay zone is indicated at Cities Service Oil Co. 1 State-J, SE SW NW 34-3n-1e, Garvin County. The lower Oil Creek sand has been tested at 4,326-50 ft. The wildcat flowed 4,260 M.c.f. of gas on a test at 3,525-70 ft.

Sterling Oil Starts Oklahoma Wildcat

Sterling Oil of Oklahoma, Inc., is moving tools to Grant County, north central Oklahoma, where operations will be started immediately on a wildcat test to Wilcox sand.

The test, Sterling's 1 Skrdla, NW NW SW 29-28n-4w, is on a structural feature located by seismograph, and is supported by surface and subsurface geology. The firm has a lease block of 800 acres surrounding the location.

While Wilcox sand (Ordovician) at approximately 5,400 ft. is the major objective, other possible producing formations include Layton sand and Mississippi lime.

You don't prospect for oil with a divining rod, but what about the maps you use?

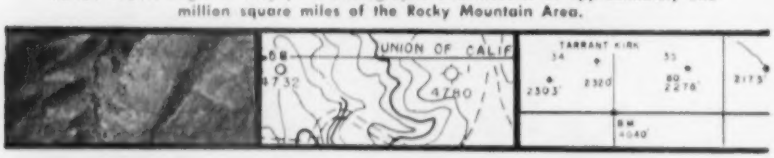
There was a time when a lot of superstitious methods were used to locate oil — but those days are long gone.

Today maps produced the Jack Ammann photogrammetric way play an important part in oil exploration and development.

Stereo-aerial contact prints for reconnaissance, geological interpretation and study — **aerial photographic mosaics** for area study and planning — **regional maps** for geology, planning, land and well data — and **topographic maps** for well, tank battery and road location and detailed development. Or, the combination of one or more of these maps for pipeline location and construction.

Call or write our nearest office to discuss your mapping problem which will be treated with the utmost confidence.

READY NOW! Regional Maps, Air Photographs and mosaics of approximately one million square miles of the Rocky Mountain Area.



Jack Ammann
PHOTOGRAMMETRIC ENGINEERS, INC
BROADWAY AT TENTH SAN ANTONIO 5, TEXAS
AIR SURVEYS—MAPS

EASTERN OFFICE: Manhasset, N. Y., 32 Hillcrest, P. O. Box 411, Phone Manhasset 7-1840
SOUTHEASTERN OFFICE: Atlanta, Georgia, 685 W. Peachtree St., N.E., Phone Elgin 1415
SOUTHWESTERN OFFICE: Houston, Texas, 1354 Chantilly, Phone Oxford 2-1702
WESTERN OFFICE: (Denver) Lakewood, Colo., 995 Flower St., Phone Bel. 3-2090
WEST COAST OFFICE: Fresno, California, 53 E. Fedora Ave., Phone 7-7290

HUGOTON EMBAYMENT

SOUTHWEST KANSAS

Potential Awaited at Kiowa Gas Discovery

Kiowa County's new Mississippian gas discovery is waiting on potential. It is Falcon-Seaboard-Gulf Oil Corp. 1 Nichols, NE NE NW 20-29s-18w.

The discovery well flowed 15,000 M.c.f. of gas per day after treatment from perforations at 4,995-5,003 ft. This is the second success on the block, the first being an oil strike which opened Pyle field about 13 miles northeast.

Interstate Field Records Its First Failure

The first dry hole for Morton County's Interstate field has been reported at J. M. Huber Corp. 5 U.S.A. "D," SE SE 29-34s-43w. Total depth was 4,490 ft. in the Morrow sand.

OKLAHOMA PANHANDLE

Beaver County Wildcat Race Leads Entire Area

Beaver County in the Oklahoma Panhandle is the most active single county in the entire Hugoton embayment. Current successes in the county promise that 1955 will be a banner year for the Oklahoma Panhandle.

Cabot Carbon Co. has completed 1 John C. Hodges, SW NE 1-5n-24eCM, 2 miles northwest of Mocane. The new oil field opener, which is 2 miles northwest of Mocane Morrow and Mississippian field production, flowed 390 bbl. of 38.6°-gravity oil per day on ¼-in. choke from the Checkerboard lime through perforations at 5,316-38 ft. The discovery's southwest offset, the 1 Judy, NE SW 1-5n-24eCM, is taking drill-stem tests after assuring Toronto gas production. The tests are being made in the Oswego lime.

Lion Oil Co. 1 Hodges, 4 miles northwest in 21-6n-24eCM, is assured Toronto gas production, and has possible Permian Council Grove gas production indicated. At Cities Service Oil Co. 1 Miles "B," SE SE NW 12-4n-24eCM, 5 miles northeast of Beaver

City and 3 miles south of Southwest Mocane field, has assured Morrow sand gas production, and Marmaton and Oswego production indicated. Nearest Marmaton production to this wildcat is 20 miles northwest at South Floris field.

The third well for Mocane field was potentialed at Carter Oil Co. 1 State-Ricards, SE SE NW 16-5n-25eCM, 1 mile southeast of Mississippian production and 2 miles east of Morrow production in the field. The well made 4,455 M.c.f. of Chester-Mississippian gas per day on open tubing. Pure Oil Co. 2 Dixon, NE NE SW 29-5n-26eCM, 2 miles northeast of Southeast Mocane field, is a possible link well between that field and Northwest Knowles field. Production is indicated from the Chester.

O. H. Parker has completed 1 Hennigh, NW NW 28-6n-28eCM, in the far northeast corner of the county. This well flowed 3,616 M.c.f. of gas and 9 bbl. of distillate per day on 7/8-in. choke from Morrow sand perforations at 6,081-91 ft. The Texas Co. 1-A Sargent, SE NW 7-5n-27eCM, 6½ miles southwest of the 1 Hennigh, flowed 734 M.c.f. of gas per day from the Morrow.

TEXAS PANHANDLE

Ellenburger News Tops Panhandle Exploration

Location has been staked by Phillips Petroleum Co. for a new 11,500-ft. test to the Ellenburger in the deep Anadarko basin portion of Gray County. The new wildcat is the 2 Delp, 7 miles southwest of Miami in Section 110, Block M-2, BS&F Survey. It is ½ mile of the deep granite wash discovery at 1 Delp, and 1 mile northwest of the 1 Troy "A" Ellenburger discovery.

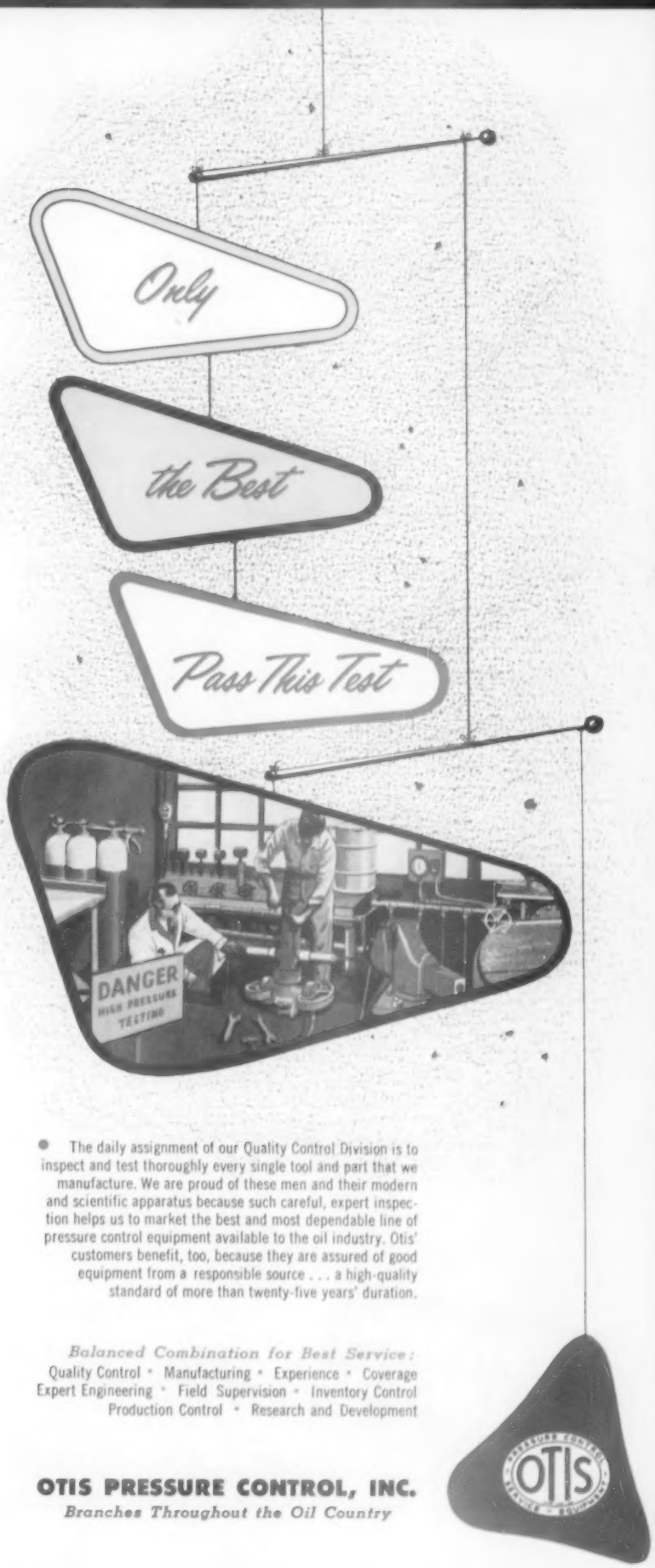
WEST TEXAS-NEW MEXICO

WEST TEXAS

Southwest Upton Wildcat Flows Devonian Oil

Humble Oil & Refining Co. had prospects of a good Devonian discovery at its 1-D Rosa H. Barnett, 83-Y-GC&SF Survey, 20 miles northeast of McCamey.

Operators reported top of the Devonian at 9,642 ft. was high to other exploratory tests in the area. The well had gas shows on drill-stem tests in the top of the formation; had first oil shows at 10,149-99 ft., and recovered its first oil at 10,470-86 ft. The latter



● The daily assignment of our Quality Control Division is to inspect and test thoroughly every single tool and part that we manufacture. We are proud of these men and their modern and scientific apparatus because such careful, expert inspection helps us to market the best and most dependable line of pressure control equipment available to the oil industry. Otis' customers benefit, too, because they are assured of good equipment from a responsible source . . . a high-quality standard of more than twenty-five years' duration.

Balanced Combination for Best Service:
Quality Control • Manufacturing • Experience • Coverage
Expert Engineering • Field Supervision • Inventory Control
Production Control • Research and Development

OTIS PRESSURE CONTROL, INC.
Branches Throughout the Oil Country

OTIS

section, tested 2 hours, developed 4,870 ft. of 44° oil.

A test at 10,509-52 ft. had gas in 6½ minutes, fluid in 83 minutes, cleaned into pits for 8 minutes, then flowed a little better than 14 bbl. of oil an hour. Choke size was ½-in., gas-oil ratio 1,862:1, and surface flowing pressure read 200 psi. There was no water. Operators drilled ahead to 10,670 ft. and were running electrical surveys.

New pay at Headlee . . . Strawn pay has been added to the Midland County area of Headlee field. U. S. Smelting, Refining & Mining Co. 1-A Roy Parks, 28-41-T2S-T&P, 6 miles southeast of Odessa, added the new pay, then completed from both the Ellenburger and Strawn.

From the Strawn its potential was 861 bbl. of 54° oil, through ½-in. choke, from perforations at 8,830-9,895 ft. Tubing pressure was 300 psi. and gas-oil ratio 1,670:1.

Ellenburger potential was 2,688 bbl. of 51° oil through ¾-in. choke, from perforations between 13,074-13,300 ft. Casing pressure was 500 psi. and gas-oil ratio was 980:1. Both zones were completed without acid treatment.

Sterling County . . . This county received another Strawn sand discovery at J. B. Randle, San Angelo, 1 S. P. Munn. Loaction in 170-2-H&TC, is 8 miles northeast of Sterling City, and 3½ miles southwest of Fuller 1 Davis, a recent Strawn discovery.

Humble 1-D Barnett, Upton County discovery, has logged over 100 ft. of Devonian pay.

No. 1 Munn completed for a flowing potential of 228 bbl. of 43° oil, with no water; through 19/64-in. choke, from perforations in Strawn sand at 7,355-7,435 ft. Gas-oil ratio was 893:1, tubbing pressure 350 psi. Top of the sand was found at 7,356 ft. on ground elevation of 2,600 ft. Operators treated the sand with a total of 21,000 gal. of acid.

ARK-LA-TEX

EAST TEXAS

Gregg County Discovery Takes Potential

John C. Robbins, Jr., and F. R. Jackson, Longview operators, have filed recompletion potential on their new Pettit limestone discovery in southeastern Gregg County.

The daily flowing gage was 160.3 bbl. of 43° oil, through 25/64-in. tubing choke, from casing perforations at 7,020-40 ft. Gas-oil ratio was 1,160:1. Flowing pressures were not disclosed.

Last December field sources credited the well with flowing upwards of 200 bbl. daily, and indicated the production was gas and distillate. Original completion on the well was dry.

Harrison County . . . Byrd Oil Corp. and Ed Hurley 2 Williams, extension try to the Waskom area, reported oil shows in sand. Operators cored into the sand at 6,217 ft. and recovered 12 ft. showing oil. Electrical surveys were being run.

ARKANSAS

February Discovery Rate

Arkansas operators opened one new oil pool and established one new oil

STANDARDIZE ON JENSEN JACKS

Get More Profit!

Every producer is interested in more profit . . . and that's why we know you'll be interested in these facts about JENSEN JACKS.

Field tests made with wells of all sizes and under all conditions prove conclusively that JENSEN JACKS lift MORE oil for LESS money—and give you MORE profit. For the proof, ask any producer with JENSEN JACKS over his wells—or take a look at his records—see for yourself.

You'll want to standardize on JENSEN JACKS once you've checked the facts, so write us or get in touch with your JENSEN Dealer now.

JENSEN JACKS

JENSEN BROS. MFG. CO., INC.
Coffeyville, Kansas, U.S.A.
Export Office:
50 Church St., New York City

pay during February exploratory drilling.

Olin Oil & Gas Co. 1 Hankton, C NW NE SW 19-19s-12w, opened Aurelle field in Union County. The well pumped 9 bbl. of oil per day from Nacatoch sand through perforations and open hole at 2,317-37 and 2,339-50 ft. The well is 1¼ miles east of Aurelle. The 1 Nunnally, C SW SE NE 19-19s-12w, ½ mile east and ¼ mile north of the 1 Hankton, was completed pumping 15 bbl. of oil per day. Fracturing was used to try for increased output at both wells.

Hibank field . . . Glen Rose oil production was opened in Hibank field, Union County, at E. G. Bradham 1 Patterson Unit, C NW SE 19-18s-14w, 5½ miles southeast of El Dorado.

The well pumped at the rate of 40 bbl. of 26°-gravity oil per day from perforations at 3,462-70 ft.

NORTH LOUISIANA

Production Assured at New Bossier Parish Prospect

Carter Oil Co. is completing a new Smackover discovery at Arkana in northern Bossier Parish, northwestern Louisiana.

The 1 Edith Hardcastle Smith, 2-

Carter Oil Co. is completing its Arkana wildcat in northern Bossier Parish.

23n-13w, flowed 282 bbl. of 49.6°-gravity oil and 39 bbl. of water per day on ¾-in. choke on drill-stem test too. Production is from perforations in the Smackover at 10,733-64 ft. The discovery is about 24 miles northwest of nearest Smackover production which is gas-condensate from the Gray sand of the Cotton Valley field, Webster Parish.

February Discovery News

February netted only two discoveries for North Louisiana. The first oil well for Locust Ridge field in Tensas Parish was completed at Southern Natural Gas Co. 1 Philip Watson, 28-10n-11e. This well finaled in the Massive sand of the Tuscaloosa at 9,101-10 ft. It flowed 165 bbl. of 39.3°-gravity oil per day on ⅛-in. choke.

The discovery well of the field, and the only producer, is Rowley 1 Adams, C NE SE 20-10n-11e. It was completed in 1954 with gas production from the Massive.

Red Rock field . . . In Webster Parish Hunt Oil Co. and associates 1 Burns et al, 9-23n-9w, established production in the Smackover "A" at Red Rock field. This well flowed 402 bbl. of condensate per day with 937 M.c.f. of gas from perforations at 10,820-65 ft. on 5/64-in. choke.

This well is the second producer for this field. The discovery well has oil production from a lower Smackover zone.

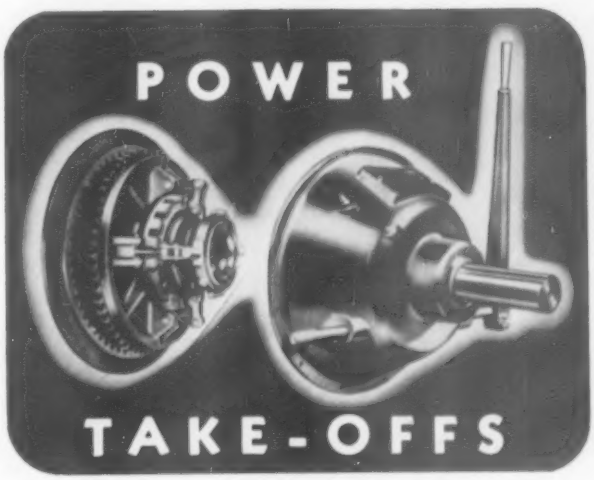
GULF COAST

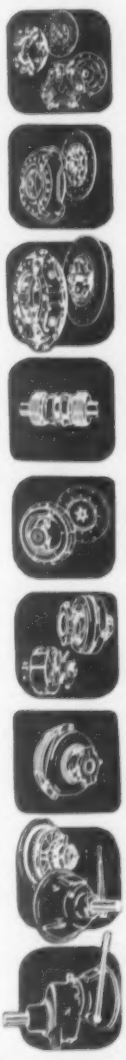
SOUTHWEST TEXAS

Oil Discovery Indicated

Testing is under way at an indicated oil-discovery well 12 miles southwest of Hebbronville, in northwestern Jim

ROCKFORD





A SIZE AND TYPE FOR EVERY USE

SELF CONTAINED UNIT
WIDE RANGE OF SIZES
CONSERVATIVE RATING
ROLLER BEARINGS
FINE ADJUSTMENT
ACCURATE BALANCE
S.A.E. DIMENSIONS

* ROCKFORD POWER TAKE-OFFS are available in standard sizes ranging from 125 foot pounds to 2100 foot pounds torque. Clutch sizes range from 6½ to 18 in. double plate. These complete, self-contained units are suitable for heavy-duty gear-tooth application to current industrial gasoline and diesel engines.

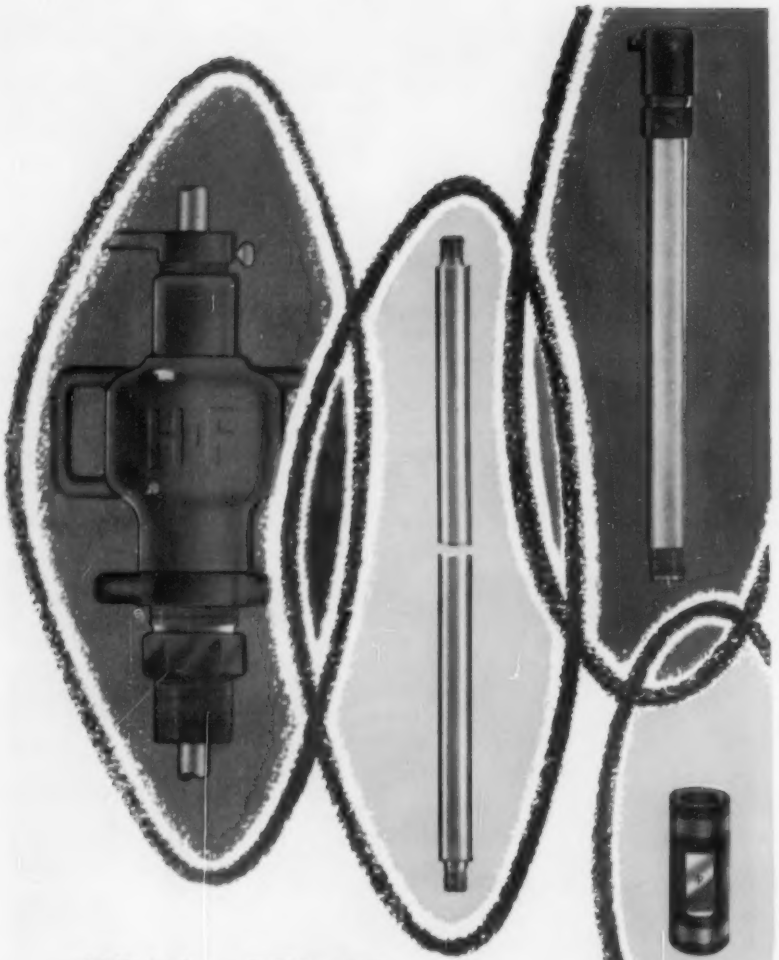
Send for This Handy Bulletin

Shows typical installations of ROCKFORD CLUTCHES and POWER TAKE-OFFS. Contains diagrams of unique applications. Furnishes capacity tables, dimensions and complete specifications.

BW

ROCKFORD CLUTCH DIVISION BORG-WARNER
▲ 1305 18th. Avenue, Rockford, Illinois, U.S.A. ▲

CLUTCHES



Which of These Harbison-Fischer Accessory Items Will Lower Your Pumping Costs?

The H-F Jumbo Oil Bath Polished Rod Stuffing Box? It has an extra large lubrication reservoir to keep the polished rod from running dry and wearing out the packing elements, and two full sets of packing rubbers above and below the oil chamber which provides an extra safety factor for wells that build up unusual pressures. The unit is strong and rugged — built to last the life of the well — and includes many extra features, such as changing packing rubbers under pressure. **H-F Polished Rods** are available in a full range of A.P.I. sizes from 8- to 22-ft. lengths in bronze, common steel, Pistonsteel, stainless steel, or Monel. Each rod is made of finest-quality stock and ground and polished to a perfect working surface. On the other hand you can save the cost of a new rod with an **H-F Liner and Packing Clamp** which fits over a worn-out rod. The high-grade seamless bronze liner tube will not rust, it works smoothly through the stuffing box, and is reversible for double life. **H-F Stellite Banded Sucker Rod Couplings** are especially recommended to reduce rod failures at the joints, due to excessive wear in slanted or crooked holes or from fast pumping. The coupling is banded with heavy inserts of Haynes Stellite at either end to withstand the severest wear and abrasion possible.

All of these — and many more — items are conveniently available through your store. Your store can also give you full particulars on other H-F products for pumping wells . . . or ask one of our representatives or write to us in Fort Worth. There's no obligation, of course.

● "Best Pumps in the Oil Patch"

HARBISON-FISCHER MFG. CO.

2501 Virginia Street . . . Fort Worth

H·F OIL WELL PUMPS

Hogg County. The well, 1 Gutierrez, drilled by Paul J. Moore, of San Antonio, in Survey 164, filled 200 ft. with clean oil in an open-hole drill-stem test of 10 ft. of sand at 3,207-17 ft. Flowing bottom-hole pressure was 265 psi. Pressure, shut-in, was 700 psi.

Gas Producer Uncovers New Starr County Field

Breuer-Robinson Oil Co. has a new gas discovery west of the Zim area, northwest of Ricaby field, in Starr County. Its 1 Marrs McLean Estate, in Porcion 80, the discovery well, is estimated good for 15,000,000 cu. ft. of gas per day. Shut-in pressure is 1,025 psi.

Completion is in sand at 2,605-08 ft. Hole had been drilled to 4,567 ft., topping the Yegua at 3,950 ft. A test in the latter formation got a gas flow, killed after a short time when water broke in.

Location is 6 miles north of Rio Grande City.

TEXAS GULF COAST

Colorado County Wildcat Discovers Gas-Condensate

A new gas-condensate field, located 5 miles west of Columbus, in northern Colorado County, appears to have been uncovered by Sinclair Oil & Gas Co.

Its discovery well, 1 Burt, in the D.

Portion of Colorado County, Texas, showing location (indicated by arrow) of Sinclair Oil & Gas Co.'s new gas-condensate discovery.

Gilliland League, drilled to 10,495 ft. and perforated in Wilcox sand at 10,363-10,451 ft., produced at the rate of 1,650,000 cu. ft. of gas and 70 bbl. of condensate per day.

Flow was through an adjustable choke with various openings. Pressure on the tubing gaged up to 2,100 psi. Gravity of the condensate was 51°.

Location is 5 miles northeast Hamel field, oil-productive from Wilcox sands at 8,700-9,800 ft., and about the same distance west of Cecil Noble field, on

NOW...

a New Line of Traveling Blocks

designed and manufactured by **UNIT RIG**

BLOCK-HOOK UNITS			
MODEL	NO. SHEAVES	SHEAVE DIA.	CAPACITY
BH-430-A	4	30"	100 TONS
BH-438-A	4	38"	150 TONS

BLOCKS			
MODEL	NO. SHEAVES	SHEAVE DIA.	CAPACITY
B-430-A	4	30"	125 TONS
B-438-A	4	38"	200 TONS
B-544-A	5	44"	300 TONS

Look at these FEATURES

- PROPER WEIGHT DISTRIBUTION FOR . . . STRAIGHT RUNNING—FREE FALLING OPERATION
- SHEAVES HAVE ROLLED FORGED SEAMLESS STEEL FLAME HARDENED RIMS
- SHEAVES MOUNTED ON DOUBLE ROW TAPERED BEARINGS . . . INDIVIDUALLY LUBRICATED
- STREAMLINED FOR SAFE OPERATION AND EASY HANDLING
- AVAILABLE IN THREE SHEAVE SIZES—FIVE MODELS

UNIT UNIT RIG

UNIT RIG & EQUIPMENT CO.

TULSA, OKLAHOMA, U. S. A.

UNIT RIG EQUIPMENT SOLD THROUGH LEADING SUPPLY STORES IN U.S.A. AND CANADA

EXPORT SALES—MID-CONTINENT SUPPLY COMPANY
45 Rockefeller Plaza, New York 20, N. Y.
Cable—MIDUNITRIG

WRITE FOR CATALOG SHEET TODAY
—OR CONTACT YOUR SUPPLY STORE

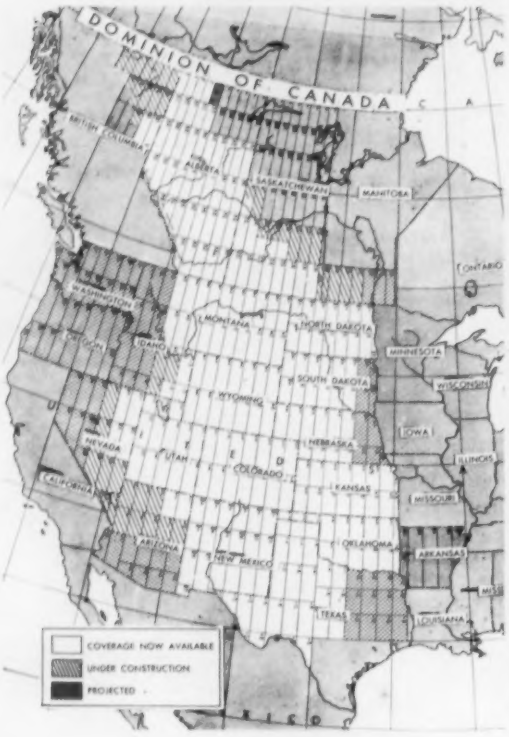
A-547

CONTROLLED
Regional Maps

Over a MILLION square miles of *Controlled* Regional Base Maps now available. Can be purchased by contract on long-term basis. Four standard scales available for Land, Geological, Geophysical and Executive use. Call or Wire.

You're SURE of MAPS by

MULDROW
Aerial Surveys Corp.
212 North Colorado
Midland, Texas



Another Job Done Better With The ALL-NEW 'Jeep'®

PIPELINE CONSTRUCTION

Here is the stop-at-nothing vehicle that travels right down the pipeline to take men and tools to the job in any weather—the 4-Wheel-Drive Universal 'Jeep'. It transports engineers and survey crews through roadless areas where ordinary vehicles cannot go. It's a time-saver the year 'round. Get full details on this versatile work horse at your 'Jeep' dealer.

WILLYS MOTORS, INC.
TOLEDO 1, OHIO

The 'Jeep' Family of 4-Wheel-Drive Vehicles . . . UNIVERSAL 'JEEP' • TRUCK • STATION WAGON • PANEL DELIVERY

THE WORLD'S MOST USEFUL VEHICLES

the east edge of Columbus, with gas-condensate production from 10 Wilcox zones, ranging in depth from 8,300 to 10,200 ft.

Algoa Extension Well Is Making Oil Producer

Superior Oil Co. is completing its third successful well in the Algoa area, in western Galveston County. Its 1 Light, ¾ mile northeast of the discovery well, completed last May, flowed 49 bbl. of 37.1°-gravity oil per day through ¼-in. choke from Frio sand, perforated at 10,392-95 fet. Gas-oil ratio was 1,244 cu. ft. per barrel.

The well is Superior's second oil producer in the field, and opens the area's third producing zone. The discovery well produced gas and condensate from sand at 11,659-65 ft. The second well, 2,300 ft. north of the discovery well, was oil-productive from perforations at 9,538-41 ft.

Hampton Well Completed

The Hampton area, 5 miles northwest of Silsbee, in Hardin County, is getting another good Yegua producer with completion by Meredith & Co. of its 1 Hooks, flowing at the rate of 114 bbl. of 42.9°-gravity oil per day through ⅛-in. choke Flow is under pressure of 1,175 psi. Pay is perforated at 7,668-74 ft. Hole was drilled to 8,000 ft.

Shallower Pay Produces In Rosharon Rework Job

A new gas-condensate pay is being opened in the Rosharon area, northwestern Brazoria County. It was discovered in a workover operation by C. W. Vick at his 1-A Sullenberger-Cannon Unit. In the top of the Frio, with perforations at 7,146-57 ft., it is the shallowest productive zone in the field so far.

The well, drilled by W. J. Allison as 1 Cannon, flowed gas and condensate (ungaged), under pressure of 2,475 to 2,500 psi. on pre-potential tests.

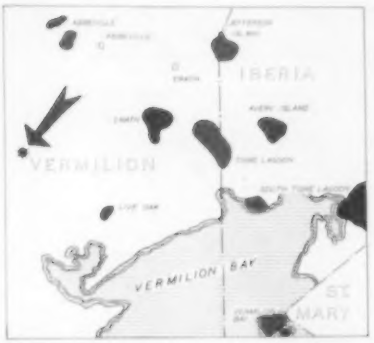
Main production in the immediate area is from sand at 7,500-7,600 ft.

SOUTH LOUISIANA

New Field Uncovered In Vermilion Parish Strike

A new gas-condensate field is in the making 9½ miles southwest of Abbeville, in Vermilion Parish, where Ohio Oil Co. is completing pre-potential tests in its deep Sagrera wildcat.

Flow through ⅞-in. choke was at the rate of 1,752,000 cu. ft. of gas with 15.6 bbl. of 49.5°-gravity condensate,



Ohio Oil Co.'s new gas-condensate discovery well, 1 Sagrera (indicated by arrow), in Vermilion Parish.

plus 84 bbl. of water. Flowing pressure gaged 2,700 psi.

Pay zone is perforated at 11,579-96 ft. Hole had been drilled to 13,620 ft. and casing run to 12,752 ft.

The discovery is about 9 miles west and a little south of the large, multiple-pay Erath field.

Gas-Condensate Discovery Indicated in Lake Arthur

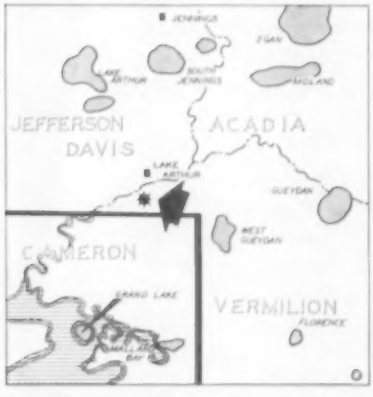
H. L. Hawkins appears to have a gas-condensate discovery well in his 2 State lease 2438, a wildcat bottomed under the bed of Lake Arthur, in the northwestern tip of Vermilion Parish.

Although no gage or estimate of indicated production was made, the well, while cleaning and before shut in because of high water, flowed gas and condensate. Shut-in pressure is 3,750 psi. The well remains shut in pending potential tests.

Prospective production is from an interval at 10,570-85 ft., where pipe is perforated. Perforations are in the drill string which was cemented in the hole when the well tried to blow out.

The threatened blowout came while hole was drilling at 11,965 ft. Bottom now is plugged to 11,532 ft.

Location is just across the lake from



H. L. Hawkins' indicated gas-condensate discovery (shown by arrow) in northwestern tip of Vermilion Parish.

NEW Powerhouse on wheels!

Trailer-mounted ONAN "CW" Electric Plant

5 or 10KW

For floodlighting, operating electric tools, emergency standby use.

Goes Anywhere!

Here's real mobility in high-capacity electric plants. You can tow a trailer-mounted Onan "CW" as fast as a car will travel . . . anywhere a tractor can go. Fully-protected by heavy-gauge steel housing; stays on the job in any weather.

Onan "CW" Electric Plants are unusually compact, quiet-running and economical to operate; weigh only half as much as water-cooled plants of the same capacity. Powered by Onan two-cylinder, suction-air-cooled gasoline engines built with massive, long-wearing parts for continuous, heavy-duty service.

WIDE RANGE OF ACCESSORIES

You can equip your "CW" Electric Plant for any type of portable service. Accessories include skid, battery rack, 9-gallon fuel tank, weather-proof housing, two-wheel trailer, or 4-wheel rubber-tired dolly. *Put one of these portable, high-capacity units on your job now!*

Write for Folder A-362

Onan ELECTRIC PLANTS

D. W. ONAN & SONS, INC.

3223 Univ. Ave. S. E., Minneapolis 14, Minn.

Another Job Done Better With The ALL-NEW 'Jeep'®

MOBILE POWER

You can save the cost of an auxiliary engine and the time lost in loading or towing it by putting an all-new 4-Wheel-Drive Universal 'Jeep' on the job. With power take-off, the 'Jeep' can be used to operate air compressors for pneumatic tools as shown above, electric power generators and other belt-driven equipment. Investigate the 'Jeep' and the auxiliary equipment that can be mounted on the 'Jeep' and operated by the 'Jeep' engine.

WILLYS MOTORS, INC.

TOLEDO 1, OHIO

The 'Jeep' Family of 4-Wheel-Drive Vehicles . . . UNIVERSAL 'JEEP' • TRUCK • STATION WAGON • PANEL DELIVERY

THE WORLD'S MOST USEFUL VEHICLES

Lake Arthur, on the Jefferson Davis Parish side. It is 4 miles northwest of West Gueydan field, nearest production.

Lafourche Parish Wildcat Tests Gas-Condensate Pay

Humble Oil & Refining Co. is continuing tests at its 1 Alton Jones, a prospective gas-condensate discovery well located about midway between Delta Farms field, slightly more than 2 miles to the north, and Little Lake field, to the south, in Lafourche Parish.

Initial tests, with prospective pay perforated at 10,762-70 ft., got a flow of 236 bbl. of fluid with an estimated 1,681,000 cu. ft. of gas per day. Flow was through ¼-in. and ⅛-in. chokes for 2 hours. Fluid consisted of 12 bbl. of 41.5°-gravity condensate and 95 per cent basic sediment and water. Working pressure gaged 3,050 psi.

Perforations have been squeezed and pipe will be reperforated for additional tests. Bottom of casing is 11,200 ft. in hole drilled to 12,090 ft.

Humble's second well will be drilled a location west of the prospective discovery well.

EASTERN INTERIOR

ILLINOIS

Additional Development Seen For Crawford County Area

Tide Water Associated Oil Co.'s 1 Kizzie Hudson, NE¼ SW¼ 6-5n-12w, Crawford County test, flowed 397 bbl. of oil in 24 hours on ½-in. choke after recovering load oil from perforations at 1,363-72 ft. in the Bethel sand after fracturing.

Location has been announced for the No. 2 well in C NE¼ NE¼ SW 6-5n-12w, and additional development is planned for the area.

Sanders & Fye Drilling Co. 1 Grubb, SW NE SE 18-3n-9e, Richland County, recovered 60 ft. of gas, 1,125 ft. of clean oil, 60 ft. mud-cut oil on tests of the Cypress sand at 2,612-21 ft. The operator has begun completion tests. The new discovery is ¾ mile from McClosky production and is located more than 2 miles from Cypress pay.

● Kenneth C. Bell 1 Collins, SW SW NE 24-8s-7e, 3 miles east of Eldorado in Saline County, has been put on the pump after swabbing 36 bbl. of oil per day after treatment. The pump test will be in the Aux Vases lime at 2,880-92 ft.

GREAT LAKES

MICHIGAN

Southeast Offset to Ensley Pool Completed

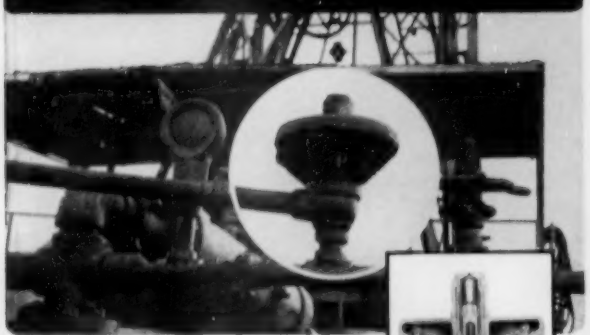
Ace Oil Co. 1 Butler, SW NW NE 7-11n-11w, Ensley Township, Newaygo County, diagonal southeast offset to Ensley-Traverse oil pool, was com-

8 out of 10 Geologists Prefer KRAFTBILT Map Cabinets

Used by America's top corporations! By ALL major oil companies. Built to last a lifetime. Ask for catalog 1054-B.

Ross-Martin Company
BOX 800 B • TULSA 1, OKLA

FULLY AUTOMATIC PRESSURE RELIEF for mud operations

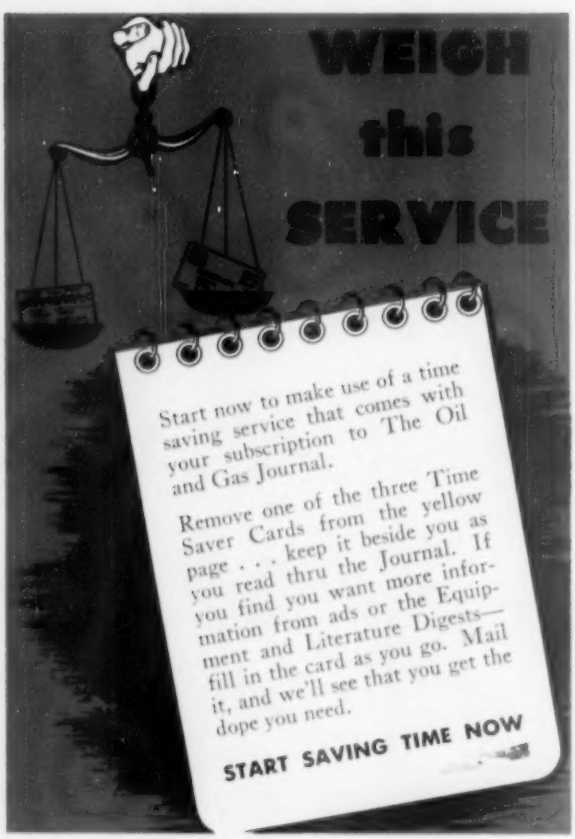


The Kinzbach Model 112 Relief Valve provides safer, more efficient pump or pressure relief and greater flexibility in operations than any other valve. It *snaps open* for instant pressure relief at maximum volume and *snaps shut* to restore circulation instantly and automatically after a predetermined pressure drop. The basic design positively prevents chatter.

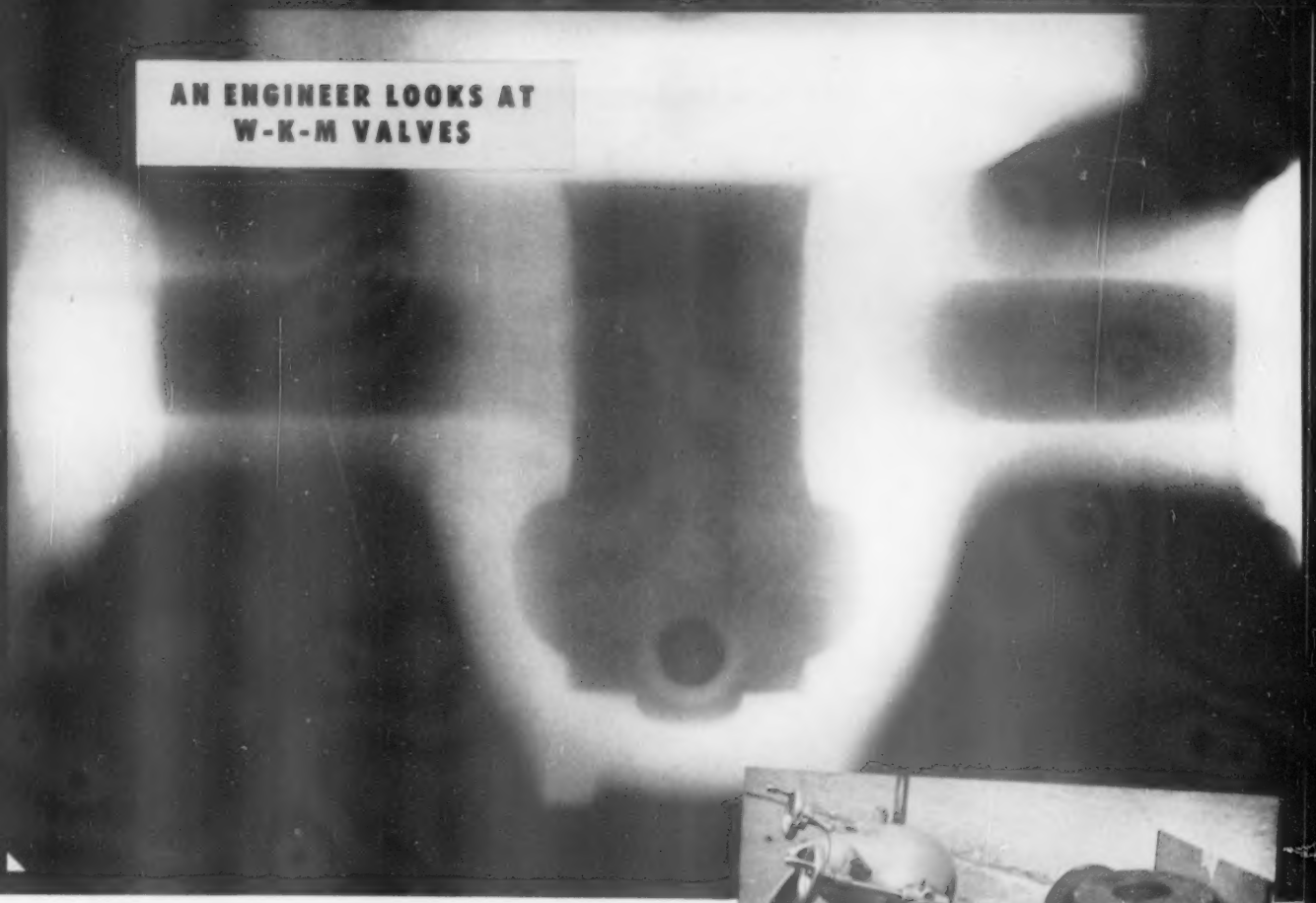
Available in 2" and 3" sizes. Write for full technical data. Ask for bulletin 11250.

Kinzbach Model 112 Relief Valve shown in closed position.

KINZBACH TOOL CO., INC.
P. O. BOX 277 • HOUSTON 1, TEXAS
Export Office:
74 Trinity Place, New York, N. Y.


WEIGH this SERVICE
Start now to make use of a time saving service that comes with your subscription to The Oil and Gas Journal.
Remove one of the three Time Saver Cards from the yellow page . . . keep it beside you as you read thru the Journal. If you find you want more information from ads or the Equipment and Literature Digests—fill in the card as you go. Mail it, and we'll see that you get the dope you need.
START SAVING TIME NOW

AN ENGINEER LOOKS AT W-K-M VALVES



On Gamma Ray Inspection

Careful gamma-ray inspection by an expert will reveal the following defects in light or heavy-section steel: gas and blowholes, sand spots and inclusions, internal shrinkage, hot tears, cracks, unfused chaplets, internal chills.

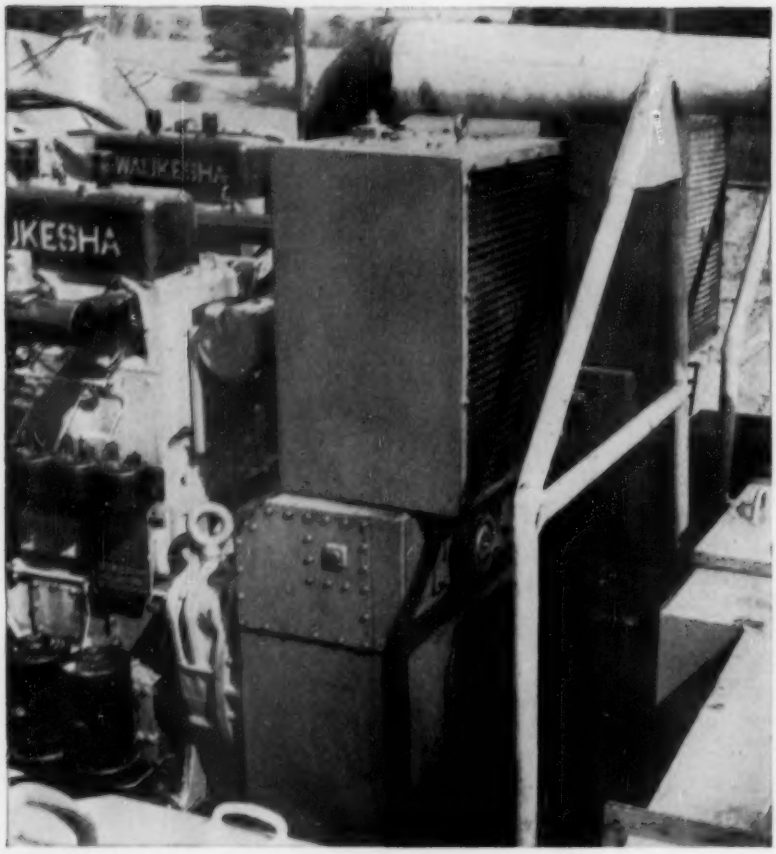
While the radiographic films mean little to the uninitiated, one familiar with them can spot defects to within 2% or less of the wall thickness. For example, if the total wall thickness should measure 2", it is possible to locate a blowhole or inclusion only .04" or less in diameter.

W-K-M uses gamma-ray inspection on the W-K-M 10,000—15,000 p.s.i. test valves. They are inspected according to the procedure outlined in the ASTM Spec. E 71-47T. When you specify valves for any high pressure service, be sure to remember that W-K-M high pressure valves are the soundest, safest buy in the field.

Top: W-K-M 2", 15,000 p.s.i. Steel Valve. Notice how lettering on the body and foundry mark (right) show up. The rectangle below the top hole is a penetrameter, a steel leaf (.05" thick) taped to the body to show the penetration of the gamma rays.
Bottom: The gamma ray "camera" contains 5000 millicuries of Cobalt 60, capable of penetrating 6" steel in 3.5 hours.

W-K-M Valves

W-K-M MANUFACTURING COMPANY, INC.
A SUBSIDIARY OF A.C.F. INDUSTRIES INCORPORATED
P. O. Box 2117, Houston 1, Texas Los Angeles, California
Export Office: 45 Rockefeller Plaza, New York, N. Y.



One of 4 Bethlehem Drilling Rigs owned by Woolf & Magee, showing Twin Disc HUD Disconnecting Fluid Power Take-Offs mounted behind Waukesha Diesels. The HUD is provided in Models 21 and 27, for up to 850 hp.

"We're 100% sold on Twin Disc products," says Partner-Owner Joe Magee of Woolf & Magee, Drilling Contractors with headquarters in Shreveport, La.

Woolf & Magee Tool Pusher M. A. Pentecost says: "We've had no trouble with the Twin Disc HUD's since the day we sunk our first hole. This is important to us, for a drilling contractor has to have equipment he can count on if he is going to make any money on the contract."

"With this fluid drive, we're saving a lot of money through longer life on chains, clutches, sprockets and bearings."

"We're getting faster footage and more flexibility," add Partner-Owners Herbert Woolf and Joe Magee. "The Twin Disc HUD makes a little rig do the job of a big rig. At the same time, it protects equipment from shocks and wear."

The Twin Disc HUD is the Disconnecting Fluid Power Take-Off, an advanced design in fluid drive which is cutting costs on rig after rig throughout the drilling industry. Like most drilling contractors today, Woolf & Magee are continually searching for a means to faster, cheaper drilling. That's why they have four Waukesha-powered Bethlehem rigs equipped with Twin Disc HUD's. The rigs have sunk 17 holes to date—for a total of 119,650 feet—with *no* downtime from the fluid drives.

With the HUD, starting shocks and overloads are dampened out. Vibrations and torsional variations are isolated. Engine lugging and stalling are prevented. Full use of peak engine torque is provided over an extended operating range. And through cushioned action of fluid, drilling, hoisting and pumping operations are smoother and steadier.

On many other rigs, the operational life of chains, clutches, sprockets, and other running parts has been doubled —and engine life has been increased considerably. Also, the usual need for engine cut-off clutches can be eliminated by the Twin Disc HUD, for this specially-designed fluid drive provides quick, positive disconnection from an operator-controlled master valve.

•

Whether you manufacture drilling equipment . . . own it . . . or operate it, you will want to investigate the Twin Disc HUD Disconnecting Fluid Power Take-Off. *Write today and ask for Bulletin 506,* from Twin Disc Clutch Company, Hydraulic Division, Rockford, Ill.

Get more contracts
make more money per contract with Model
HUD fluid drive

With the Twin Disc HUD Disconnecting Fluid Power Take-Off, you'll make hole faster—at less cost per foot—through these 7 basic benefits:

- Reduces impact shocks up to 70%, on both driving and driven equipment.
- Dampens starting shocks and overloads.
- Permits full use of peak engine torque over an extended operating range.
- Balances compounded drives.
- Prevents engine lugging or stalling under load.
- Eliminates need for engine compound clutches, through HUD's exclusive disconnect feature.
- Extends range of available speeds and pressures on mud pumps.

Write to Twin Disc Clutch Company, Hydraulic Division, Rockford, Illinois, TODAY —request new Bulletin 506

TWIN DISC

TWIN DISC
Fluid Couplings

Twin Disc Clutch Company
Racine, Wis.
Hydraulic Division, Rockford, Ill.

pleted as the first good producer to follow the discovery.

The well is being restricted to 75 bbl. of oil per day after flowing 129 bbl. net oil in 18 hours on 20/64-in. choke after acid. The well appears to be as good as, or better than the James J. McGerry, Trustee 1 Cook discovery well. No water was in evidence. Locations were staked for at least four other wells to the south and southeast of the discovery.

Meanwhile, Ace Oil Co. Cushman, SW NW SW 8-11n-11w, a semi-outpost to the southeast, but still part of the Ensley feature, was completed for only 3 bbl. of oil and 14 bbl. of water per day, pumping after acid. This well may be reworked.

Isabella County . . . A pumping unit will be set to continue natural production tests at Neyer, Miller & Gallagher 3 Powell, SE SE NE 30-16n-5w, Dundee oil discovery well in Gilmore Township.

The well swabbed and flowed 42 bbl. of oil after being shut in for 2 days. The following day the swab-flow production was 20 bbl. Operators believe that the 3 Powell will produce from 25 to 30 bbl. of oil per day, natural with very little agitation with pumping unit.

Clare County . . . The second big Dundee oil producer in the Franklin Township division of Skeels oil field appeared in prospect at Don Rayburn 2 Roemelen, NE SE NE 25-20n-3w, when circulation was lost, and the well started to kick out while coring was in progress at about 3,910-20 ft. The well is the approximate north 10-acre offset to the first big Dundee producer in this area of the pool, and on the same lease.

Saginaw County . . . After several weeks of testing, J. V. Wicklund, Jr. 1 Morse, E½ SE NW 20-10n-6e, Birch Run Township, was completed in the Dundee good for 25 bbl. of oil per day, pumping, after treatment. Additional drilling in the area is scheduled to begin in the next 30 days.

APPALACHIAN

WEST VIRGINIA

In Huntersville district, Pocahontas County, West Virginia, United Fuel Gas Co. 8176 Seth M. Chapman, rank wildcat, elevation 2,429 ft., was dry, Oriskany sand 3,445-85 ft., Clifton Forge 3,678-3,716 ft., water at 2,430-3,507 ft. TD 3,579 ft.

● Harris district, Godfrey L. Cabot, Inc. 1424 Fee wildcat was dry, Corniferous lime 4,257 ft., Oriskany sand

LONGER THREAD LIFE IN EVERY BUCKET!

MONEY-BACK GUARANTEE

MONEY-BACK GUARANTEE

Sold through your favorite supply store

Use JIMMIE GRAY Dope Brushes

PETROLEUM DISTRIBUTING COMPANY
BOX 303 - HOUSTON, TEXAS - CHarter 5648
Quality Oil Field Lubricants Available in LA. - MISS. - TEX. - N.M. - N.D. - WYO.

... loves 'em all!

.. AND MORE, too!!

Muds that will withstand a high degree of contamination by gypsum, lime, anhydrite, limey shales, clays, cement, and salt are possible when you use Marathon's Calcium Lignosulfonate as a conditioner.

This outstanding dispersant reduces viscosity, gel strength and water loss in lime-treated drilling fluids. It performs well in both conventional lime muds and low lime, low caustic muds. It is also an excellent stabilizer for water base emulsion muds.

Whenever you encounter difficult drilling conditions, switch to a lime treated or emulsion mud prepared with Marathon's Calcium Lignosulfonate. It's available under the tradename Lignox†.

LIGNOX†
may be obtained from
BAROID DIVISION
NATIONAL LEAD COMPANY
HOUSTON, TEXAS
†Reg. T.M., National Lead Company

MARATHON Corporation
CHEMICAL SALES DEPARTMENT
ROTHSCHILD • WISCONSIN

4,328 ft., show gas 4,330 ft., TD 4,330 ft.

● Circleville district, Pendleton County, Columbian Carbon Co. 2-1203 U.S.A. has resumed drilling and is at 6,106 ft.

PENNSYLVANIA

Buffington Township, Indiana County, Southwest Pennsylvania, Felmont Oil Corp., is clearing off the location for 1 Marjorie Shankel rank wildcat, elevation 1,608 ft., Barnesboro Quadrangle, 3.2 miles south of latitude 40 degrees 35 minutes and 4.3 miles west of longitude 78 degrees 55 minutes.

OHIO

W. H. Patton 1 Harold Neldon, 2nd Quarter, Bethlehem Township, Coshocton County, was reported at 200 bbl. with an unestimated amount of gas in a 24-hour test after treatment. Clinton sand at 3,420-65 ft. had 40 ft. of pay with a good oil showing and 300,000 cu. ft. gas natural. The producer is 1 mile east of Shearer pool and 1 mile northwest of the discovery on James Waring.

● Waverly Oil 1 H. G. Woolard, Lot 3, Madison Township, Licking County, the first offset to the 1 Leslie, gaged 150 bbl. and 350,000 cu. ft. in a 24-hour period after fracturing. Clinton at 2,710-40 ft. had a good showing of both oil and gas natural.

EASTERN KENTUCKY

In Leslie County and located on Woodson Fork of Bowens Creek, United Fuel Gas Co. is drilling at 3,110 ft. on Fordson Coal Co. No. 12, a wildcat test for the area. Corniferous lime was topped at 3,033 ft. and carried shows of gas at 3,036 ft. and 3,041 ft. From 3,069-71 ft. 2 bbl. per day oil show was had. Operators are drilling ahead to further evaluate the lower Corniferous section.

WESTERN CANADA

ALBERTA

Location Staked for Second Well at Prolific Westward Ho

Initial potential of 1,002 bbl. of 35.2°-gravity oil per day from the Mississippian is reported at the Hudson's Bay and Home-Federated Group's Westward Ho discovery 55 miles northwest of Calgary. The first offset well has also been announced. The new well will go down ⅜ mile southwest of the discovery well.

The discovery well, Hudson's Bay-Oilwell Operators 1 Westward Ho. LSD

for releasing stuck tubing strings...

BAASH-ROSS PRODUCTION SAFETY JOINTS

CHOICE OF

right hand rotation compression release

left hand rotation compression release

right hand rotation tension release

left hand rotation tension release

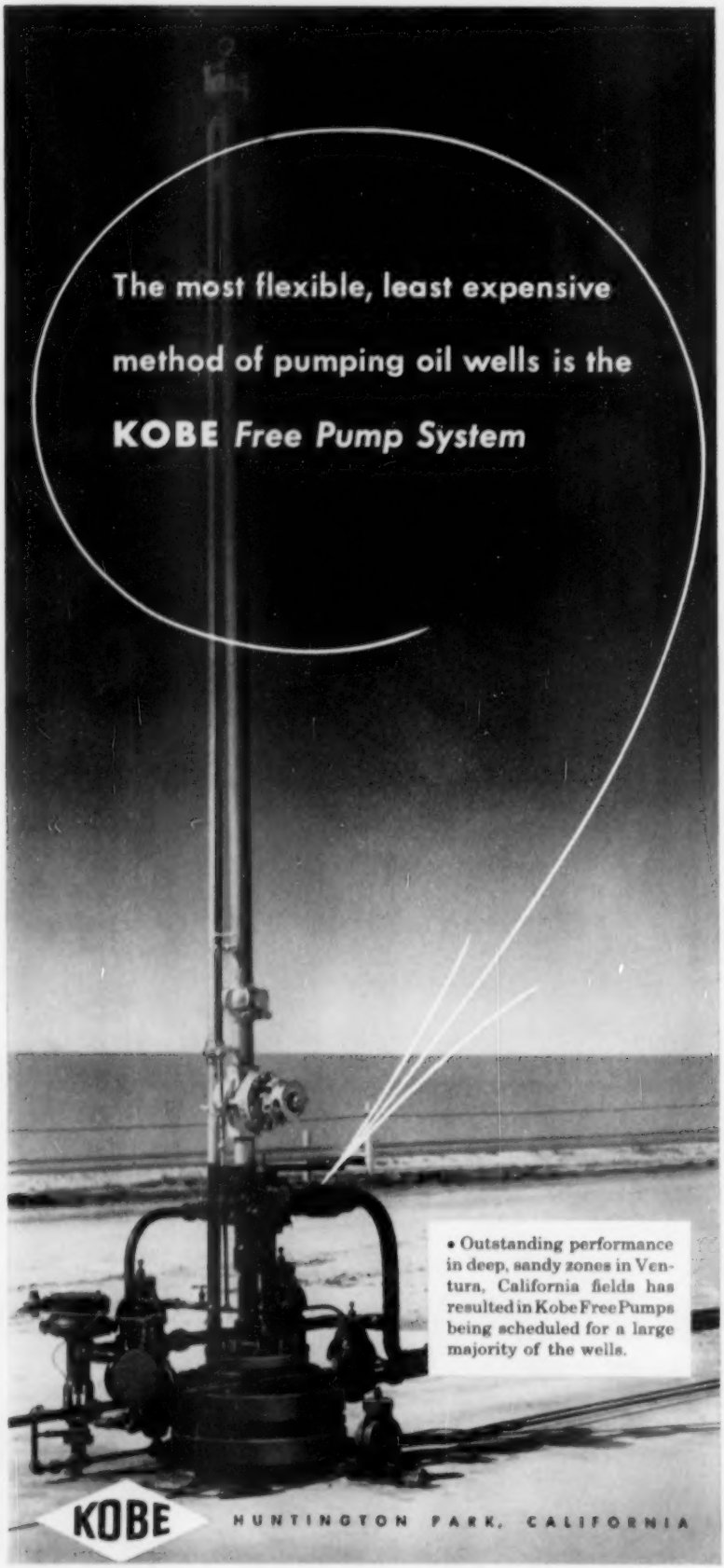
Low-cost assurance of releasing tubing from stuck packers or sanding conditions

A type for every production string... leak-proof seals ...easy to unlock... quick release... choice of releasing actions... selective release of multiple units.. unique lock permits heavy rotational loads... no danger of over-tightening... no friction or tapered shoulders involved... I.D. same as tubing string... O.D. same as tubing couplings.

BAASH-ROSS TOOL COMPANY

DIVISION OF JOY MANUFACTURING COMPANY

Los Angeles...Houston...Oklahoma City...Odessa...Casper...Canton, O....New York City


The most flexible, least expensive
method of pumping oil wells is the
KOBE Free Pump System
• Outstanding performance in deep, sandy zones in Ventura, California fields has resulted in Kobe Free Pumps being scheduled for a large majority of the wells.
KOBE
HUNTINGTON PARK, CALIFORNIA

7, 8-33-4w5, is 6¼ miles southeast of the Sundre Mississippian oil discovery. It is perhaps the second most important discovery of the year for Canada . . . the first being at Clear Hills. The producing zone is 8,790-8,830 ft. and 8,757-74 ft. in the Mississippian.

The Westward Ho discovery is highly important for the Foothills area of Alberta. It has proved that there is oil in the deeper zones in the area. The Sundre discovery to the northwest of Westward Ho is considered the biggest Mississippian strike since Turner Valley.

SASKATCHEWAN

Light Gravity Oil Reported At Antler River Prospect

Imperial Oil, Ltd., reported discovery of some light-gravity oil at its southeast Saskatchewan wildcat in the Antler River-Carnduff district, 50 miles northeast of Estevan and less than 20 miles north of the North Dakota border.

This venture found oil, rated at higher than 35 gravity, in the Mission Canyon member of the Mississippian. The test also had salt water. The well, Imperial 8-34 Antler River, LSD 8, 34-3-33w1, is about 8½ miles southwest of the Nottingham oil discovery and about 12 miles south of Alida production.

ROCKY MOUNTAIN

WYOMING

Three State Wildcat Discoveries Completed

Three successful wildcats were completed in widely scattered Wyoming prospects during the past week. In Washakie County, on the eastern flank of the Big Horn basin, Sohio Petroleum completed 1 Water Creek Unit, SE SE SE 36-44n-91w for a pump gage of 328 bbl. of oil per day. Production is from Phosphoria, with perforations at 6,005-21 ft. The well was drilled to total depth of 6,418 ft., and tested Tensleep without success before completion in Phosphoria. While the oil produced is low gravity, it contrasts with most Phosphoria production in this basin in that it is sweet, with very little sulfur content. The discovery is 5 miles north of production in Black Mountain field.

In the southeastern portion of Wyoming, F. R. Anderson and Great Basins Petroleum, Inc., reported a pump gage of 68 bbl. of oil per day at Goshen County's first producer. The well is 24-D-33 Airport, SE SE SW 32-24n-61w, on the outskirts of Torrington. Production is from "J" sand

at 6,917-24 ft. Location is in the northwestern portion of the Denver-Julesburg basin. The Wyoming portion of this basin has had relatively little previous exploration. Where sand development has been found, it is spotty in the few wells previously drilled. There is production on the northwest flank of the basin at Horse Creek, and some small production in the Pine Bluffs area, but there is no previous production within 40 miles of the Goshen County discovery.

Since first tests of this well were released, there has been rising lease interest in Goshen County, and in the general southeastern Wyoming area.

The third completed discovery is a new pay oil producer in the Tip Top Unit, Sublette County, in the southwestern quarter of the state. General Petroleum Corp. reported a flow of 108 bbls. of 59°-gravity oil per day at 26-X-12, SE NW SW 12-28n-114w. No tops other than sample top of first Frontier at 5,365 ft. were released. The operator reported perforations at 5,299-5,301 and 5,700-01 ft. Other perforations, if any, have not been reported. The well tested commercial quantities of gas during drilling but was completed as an oil well. It is 1 mile south of General Petroleum's discovery in Nugget in the Tip Top area. The latter well was drilled in 1951.

Sherard Area Wildcat Swabbing

Superior Oil Co. is reported swabbing 1 Government-Chittim, C SW SW 29-47n-90w, in the Sherard area of Washakie County. The wildcat is 10 miles east of Worland. Official data has not been released by the operator. Unofficial estimate of swab recovery was oil at the rate of 200 bbl. per day. Phosphoria was perforated at 8,800-32 ft. Crude at this discovery is also reported as very low in sulfur content. Nearest previous production is at Hidden Dome, 3 miles to the north.

Sheridan County Wildcat Locations Made

Shell Oil Co. has made location for another deep test in the Ash Creek area of Sheridan County. The new wildcat is 1 Demple, NE SE NW 22-55n-85w. It is scheduled to test to Ordovician at about 11,000 ft. Location followed closely Shell's abandonment of a deep test in C NE SW 30-58n-84w. The operator conducted a deep drilling program in this portion of the Powder River basin in 1951 without success. Lands in the area were later farmed out, and on this farmout the Ash Creek discovery was made.

Gulf Oil Corp. has also made location for a Sheridan County wildcat. It is 1 Carter, C SE NW 32-58n-86w. It is to test Ash Creek, and is 10 miles southwest of production in Ash Creek field.

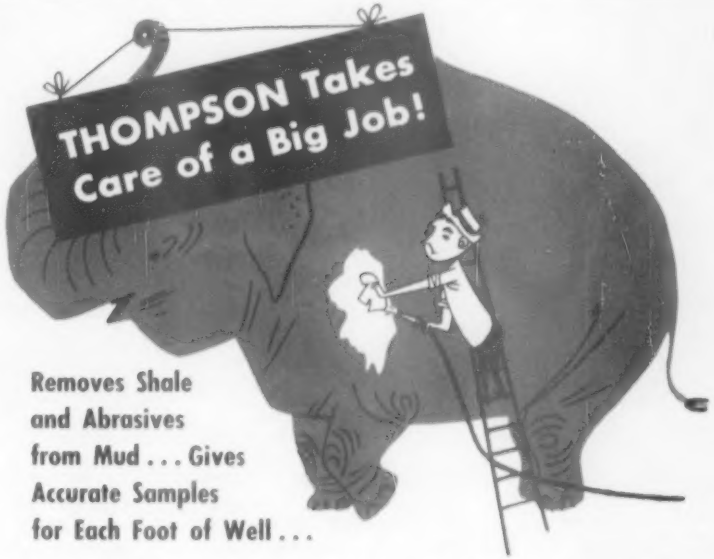
MONTANA

New Pay Discovery At Northwest Sumatra

McAlester Fuel Co. has completed 3 NP, C SE SE 7-11n-32e, in Northwest Sumatra field, Rosebud County for a flow of 8 bbl. of oil per hour through ¼-in. choke. Production in this well is from Amsden with perforations at 4,012-17 ft. The well is the first completion in this formation in the field. Previous drilling found apparently commercial shows in Amsden, but no completions have previously been attempted in the formation. Production has been from Heath in previous drilling.

Pattern Set for Fertile Prairie Field

The Montana Oil & Gas Conservation Commission has ordered tempo-



Removes Shale and Abrasives from Mud . . . Gives Accurate Samples for Each Foot of Well . . .

A THOMPSON Rotating Shale Separator and Sample Machine can really take it while removing all shale and abrasives from drilling muds. Not only that, a THOMPSON Separator gives accurate formation samples every foot of the way down. It's a part of the standard drilling equipment used by wise operators and drillers to save drilling costs and prolong life of drilling equipment. The famous THOMPSON is low in cost and operation, is easily transported and installed, self-motivated, and driven by V-belts and gears . . . no troublesome chains to foul up. It's field tested and will pay for itself.

Write us for Free Illustrated Folder giving information you'll appreciate

Manufacturers also of the famous THOMPSON Vibrating Shale Separator and Sample Machine.

THOMPSON TOOL CO.

IOWA PARK, TEXAS

SOLD THROUGH SUPPLY STORES EVERYWHERE

With another new development — the GSI VELOCITY STREAMER — GSI offers *improved seismic data* in offshore exploration. The GSI Velocity Streamer is a seismic detector array designed specifically to present advantages of multiple seismometers (6 per group) in marine work. It is another example of GSI's continued efforts to increase the effectiveness of geophysics . . . to stay ahead in development of instruments and interpretation techniques . . . to secure *more useful information* for its clients.

THE GSI VELOCITY STREAMER

- ***electro-magnetic seismometers are self-orienting***
- ***smooth outer jacket reduces underwater snagging***
- ***applicable for both single-ship and multiple boat operations***
- ***buoyancy easily modified for recording on bottom or at any desired depth***
- ***2700-foot length, 144 seismometers in 24-trace system.***

Write for GSI Information Bulletin No. 55-1

1930 ☆ 1955 GSI 25TH ANNIVERSARY

GEOPHYSICAL SERVICE INC.
5900 LEMMON AVENUE • DALLAS 9, TEXAS

Finding a World of Oil for a Quarter-Century

rary 80-acre spacing in Fertile Prairie field, Fallon County. The order is to be in effect for a period of 1 year. The discovery was completed earlier this year by Monoco Oil, with production from Ordovician. No completions have been effected since the discovery, but two wells in the field are now nearing completion.

NORTH DAKOTA

Dunn County Wildcat Finds Additional Small Shows

Mobil Producing Co. recovered mud with shows of oil and gas on test of F-22-22-I Bird Bear, et al, NE SW 22-149n-91w, Dunn County. Test was of the zone 10,045-10,100 ft. Tool was open for 3½ hours and recovered 100 ft. of mud, 360 ft. of slightly gas-cut mud, and 150 ft. of mud lightly cut with gas and with flecks of green oil.

The operator is drilling below 10,100 ft., and is scheduled to go to about 11,600 ft. The wildcat has had numerous small shows, but none of definite commercial value.

COLORADO

Logging Schools to Be Held In Denver Hotel

Lane-Wells Co. has announced its intentions of holding a series of Radioactivity Well Logging schools dealing with theory, interpretation and analysis of these type logs. It will not only cover radioactivity well logs from the Denver-Julesburg basin, but from the entire Rocky Mountain area.

The schools will be held in the Mezzanine Room of the Shirley Savoy Hotel in Denver on March 10, 11, 24, 25, and April 7, 8, 21, 22. Each will be a 2-day class starting at 8:30 a.m. and ending at 5 p.m. Persons interested in attending these classes are asked to contact Bill Pugh, 204 Patterson Building, or phone KE 4-7528 in Denver for reservations.

Washington County Discovery Pumps

J. M. Thomson and Leon Oliver, Jr., reported a 24-hour pump recovery of 187 bbl. of oil at 1 Warren, SW SW NW 11-2n-49w, eastern Washington County.

Production is from "D" sand at 3,838-44 ft. The well is the easternmost discovery this far south in the Denver-Julesburg basin. An offset drilled by Argo Oil at 1 Petrie, SE SE NE 10-2n-49w, recovered commercial quantities of oil from a substantial "D" sand section, and is now waiting on

GRUVAGRIP

couplings and fittings for grooved pipe

ON LARGE PIPE or small, GRUVAGRIP couplings and fittings save you the expense of welding, flanging or threading. You apply GRUVAGRIPS in three fast steps: slip greased gasket over pipe ends; place housing halves over gasket; insert and tighten two bolts. Easy to remove, they can be re-used indefinitely. GRUVAGRIPS are ideal for lines that must be periodically opened for cleaning.

They fit ¾" through 14" pipe with working pressures to 1,000 psi—are made of malleable iron (painted with rust inhibitor) or aluminum. Ask to see GRUVAGRIP couplings and fittings this week at your supply store.

WRITE TODAY for prices and free illustrated folder 55-D. It gives you full description and specifications of GRUVAGRIP couplings and fittings.

GRUVAJOINT lightweight couplings for grooved pipe and ROLAGRIP couplings for plain end pipe.

CUTAWAY VIEW shows how GRUVAGRIP key sections fit into pipe grooves leaving room to absorb shock, vibration, layout misalignment, expansion and contraction.

Tough resilient synthetic gasket forms seal that strengthens under pressure or vacuum. Gasket resists deterioration by petroleum, chemicals, salt water; withstands abrasive action.

Gustin-Bacon Manufacturing Company

210 West Tenth Street Kansas City 6, Missouri

completion. The latter well had more than 30 ft. of apparently productive "D" sand. New interest in eastern Washington and western Yuma County prospects has resulted from this discovery, with lease activity in area reported very high since success of the Thomson-Oliver discovery was assured.

Prowers, Yuma County Wildcats Staked

Amerada Petroleum Corp. has made location for a 5,200-ft. test at 1 Crook, C NE SE 8-24s-47w, in the Willow Creek area of Prowers County. The wildcat is 8 miles southwest of Lamar, in an area which has had no previous drilling.

In Yuma County, Shell Oil Co. has located for 1 Hanson, SW NW 15-5n-48w. This well is 18 miles northeast of recent Washington County drilling which has increased interest in western Yuma County.

Weld County Wildcat Recovers Gas

Sorelle & Sorelle have recovered gas at the rate of 5-6,000 M.c.f. per day on test 1 McPherson, C NE SE 19-5n-61w, Weld County, according to unofficial reports. No data has been released by the operators. Test was reported at 6,687-6,708 ft. and tool was open 30 minutes. The tested interval was in "J" sand. The wildcat is 5 miles west of production in Masters field. It was last reported coring below 6,713 ft.

Stain Found in "D" Sand At Yuma County Wildcat

Shell Oil Co. reported good oil stain in samples from the "D" sand zone 3,841-44 ft. at 1 Hanson, SE SW NW 15-5n-48w, Yuma County. The operator attempted a drill-stem test of this zone, but had no recovery due to mechanical failure. The wildcat is 20 miles southeast of existing gas production.

Entrada Test Staked In Mesa County

Gulf Oil Corp. has made location for a 7,500-ft. test of Entrada at 1 Mulrooney, C NE NE 29-8s-97w, in Mesa County. Location is in the Coon Hollow unit. The operator has done no drilling in the area, but the township has had four dry holes completed, all prior to 1948.

Weld Wildcat Finds Free Oil in Pierre

A drill-stem test of the Pierre shale at H. Osmond 1 Dier, C NE SE 8-2n-67w, Weld County, recovered 90 ft. of free oil, 120 ft. of highly oil and gas-cut mud, and 105 ft. of slightly oil and gas-cut mud.

The operator made the 3-hour test of the zone 6,730-6,860 ft. in a fractured zone of the Pierre. Pierre shale is the oldest producing formation in the Rocky Mountain region, having opened the old timer, Florence-Canon City pool in 1861.

UTAH

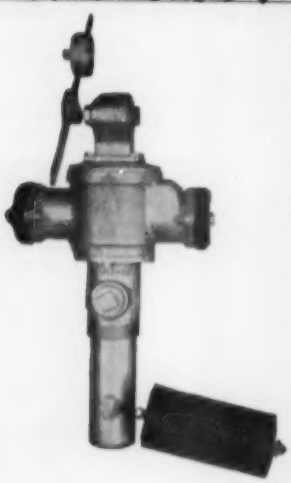
New Pay Discovery Completed at Chapita Wells

Continental Oil Co. has completed 2 Unit, NE NW SE 28-9s-23e, Uintah County, as a new pay discovery for the Chapita Wells unit. The well flowed at the rate of 4,618,000 cu. ft. per day from Wasatch at 5,052-84 ft. The discovery well on the unit produced both oil and gas from Mesaverde.

NEBRASKA

Cheyenne County Discovery Being Completed

J. W. Braden and National Cooperative Refinery Association have run pipe



Those endless steps to check tanks are now unnecessary. With an Enardo semi-automatic fill valve, the cocking lever mechanism is also a visual indicator of fluid movement and may be seen from the ground. The lever is easy to cock from the catwalk, just push end of weight lever down and your visual indicator is set. Lever weight up, tank filling; lever weight down, tank full and oil routed to next tank.

Optional equipment on the semi-automatic fill valve is a switch that will shut down the pumping engine, actuate a light on a central control panel, or in night operations, turn on a light at the tanks.

Find out how this process correlates with the Enardo Vapor Control system, by eliminating excessive opening of your hatches.

Write Enardo today for further information on the Enardo semi-automatic fill valve. Bulletin #7

ENARDO manufacturing company
BOX 1647 • TULSA, OKLAHOMA

and are waiting on completion tools at 1 Farr, C NE SE 32-17n-51w, Cheyenne County. The well is an apparent J sand discovery. It was drilled to total depth of 5,290 ft. with casing set on bottom after recovery of 910 ft. of free oil and 90 ft. of oily mud on test at 5,198-5,241 ft. Tool was open 1½ hours. The well is 1½ miles west of production in Wenkleman pool.

PACIFIC COAST

OREGON

Malheur County Wildcat Blows Out

Oroco Oil Co., Ontario, Ore., and J. R. Simplot Co. of Boise reported a blowout from about 600 ft. at their joint wildcat, 1 Bolles, NE NW 15-17s-47e, in eastern Malheur County. Samples indicated a 30-ft. section of Pliocene sand at about the 600-ft. level. The operators controlled the well, and were last reported running logs. Casing may be set before proceeding with further operations. There was no estimate of the gas volume, but with total depth at 1,540 ft. the well unloaded 600 ft. of 9-lb. mud.

This wildcat is 2 miles north of a recent temporary abandonment by Oroco in Payette County, Idaho. The latter well had shows of gas at 1,442 and 1,750 ft., with volumes estimated to 100,000 cu. ft. per day.

This general area of Idaho and Oregon has been of increasing interest since construction of the Pacific Northwest Pipeline was apparently assured. It will offer the first market to the area, and should stimulate exploration. A number of major operators are reported leasing through the area.

BASIN AND RANGE

NEVADA

Eagle Springs Wildcat Drilling Below 7,300 Ft.

Shell Oil Co. is drilling on down from 7,327 ft. at 35-35 Eagle Springs Unit in Nye County.

Recovery on a drill-stem test at 6,990-7,032 ft. was 153 ft. of watery mud. A test at 7,152-7,300 ft. got 20 ft. of mud in 1 hour. This well is the apparent confirmation to Shell's oil discovery on this unit. Commercial amounts of oil were recovered from the zone 6,606-78 ft. This well is 1,700 ft. south of the discovery well. Some reports state that the producing zone is a sand and limestone rather than the volcanics that produced in the discovery well of Eagle Springs.

Successful Wildcats

SOUTHWEST TEXAS

Atascosa County: J. J. McBride 1 Weimers, W. M. Duck Sur. 334, A-200. IPP 9 BOPD (net), 2 per cent water, 29.4°, open hole 1,462-1,507 ft. TD 1,507 ft. (New pool—Somerset area.)

J. J. McBride 1 Muennick, T. Viastrigo Sur., A-876. IPP 8 BOPD (net), 2 per cent water, 29.4°, perforations 1,469-79 ft. TD 1,479 ft. (Extends Somerset field.)

Brooks County: The Texas Co. 8 Alexander, Palo Blanco Grant, A-436. IP 119.86 BOPD, 5/32-in., 41.5°, perforations 4,140-60 ft. TD 5,812 ft. (New pay in Palo Blanco field.)

Zapata County: Alaska Steamship Co., Texita Oil Co., and E. W. Gill 1 Velva, Porcion 34 (3½ miles east of Zapata). IP 7,000 M.c.f. daily, open-flow potential, dry gas, perforations 3,760-75 ft. TD 6,019 ft. (New field.)

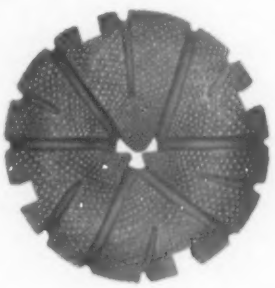
TEXAS GULF COAST

Harris County: J. M. Flaitz and R. B. Mitchell 1 Chalmers, Max Noack Sur. 12, A-1529. Shut-in gas well, no gage, perforations 7,174-78 ft. TD 7,323 ft. (New pay in South Satsuma field.)

San Patricio County: Texita Oil Co. et al 2 W. A. Jennings, J. P. Borden Sur., A-338. Shut-in gas well, no gage, perforations 2,525-29 ft. TD 2,835 ft. (New pay in unnamed area, 4 miles north of Mathis.)

Victoria County: A. J. Bankhead 1 Koontz

the answer to many of your drilling problems



TRUCO CONCAVE DRILLING BITS

When you're making hole too slow and making trips too often it's time to consult your nearest D & S Field Engineer about Truco Concave Drilling Bits. Trucos do the job faster at less cost per foot.

DRILLING & SERVICE
3031 Elm Street
Dallas 1, Texas

TRUCO DIAMOND BITS AND D & S CORE BARRELS

THE OIL AND GAS JOURNAL

"Ah, the hills—the everlasting—never-changing hills."

DESIGNED FOR OIL FIELD WORK

THE CARCO GO WINCH is specifically designed for oil field and pipe line work. It's a two-speed winch with large cable capacity, low speed and high line pull. It's proven itself ideal for towing ditchers and other heavy equipment, pulling, loading, unloading and lifting pipe, rescuing ditched and mired equipment, spotting rigs and for other pipe line and oil field uses. A four-roller fairlead, which can be bolted directly to the winch, adds speed and flexibility by maintaining maximum line pull regardless of the direction of the load. Ask your nearest Carco dealer about the Carco GO winch. Mounts on tractors in the 76 to 100 horsepower range. PACIFIC CAR AND FOUNDRY COMPANY, Renton, Washington. Branches at Portland, Oregon, and Franklin Park, Illinois.

estate, Agapito de Leon Sur., A-63. IP 70 BOPD (net), 71 per cent water, 5/32-in., 31°, perforations 6,078-80 ft. TD 6,762 ft. (New field—North Koontz.)

WEST CENTRAL TEXAS

Callahan County: R. Clay Underwood 1 Dyer, Sec. 22, ETRR Sur., 6 mi. N. Baird. IP 208 BOPD, 20/64-in., 42.5°, TP 100 psi., GOR 1,040, Bluff Creek sand 1,105 ft. TD 1,117 ft.

Coleman County: Kirk & Neeb 1 DeBush, W. T. Dunlavey Sur. 259, 2½ mi. N Echo. IP 90 BOPD, 10/64-in., 41°, GOR 1,524, TP 155 psi., Gray sand 2,278 ft. TD 2,291 ft.

Fisher County: Carl E. Siegesmun 1 Morris, 190-3-H&TC, 8 mi. S Roby. IP 124 BOPD, 14/64-in., TP 25 psi., GOR 529, 48°, Pennsylvanian 5,162 ft. TD 6,206 ft., elev. 2,085 ft.

Taylor County: Cannon Drilling Co. 1 Pinchley, 62-19-T&P Sur., 1½ mi. N Blair. IPP 85 BOPD, 37.5°, GOR 225, Noodle Creek lime 2,512-15 ft. TD 2,973 ft.

NORTH TEXAS

Archer County: DeBus & Montgomery 1 DeBus, Sec. 2, A-1202, SPRR Sur., 2 mi. W Holliday. IPP 15 BOPD, 38°, low GOR, pay 614 ft. TD 624 ft.

Montague County: Arnold H Bruner & Co. 1 Campbell, Blk. 3, MEP&P Sur., A-523, 2½ mi. NE Montague. IPP 77 BOPD, 41°, GOR 400, conglomerate 6,342-47 ft. TD 6,520 ft.

WEST TEXAS

Schleicher County: Caroline Hunt Trust 1 Nixon, 177-A-HE&WT, 8 mi. SW Eldorado. IP 1,200 M.c.f., 20/64-in. choke, shut-in pressure 1,750 psi., Strawn pay 6,820-30 ft. TD 7,786 ft. Elev. 2,344 ft., Ellenburger 7,135 ft., Wilburns 7,428 ft., Cambrian sand 7,483 ft.

Sterling County: W. M. and A. P. Fuller 1 Davis, 73-2-H&TC, 15 mi. NE Sterling City. IP 353 BOPD, ¼-in., Strawn sand perforations 6,874-6,950 ft., TP 650 psi., GOR 322, 41°. TD 7,000 ft., ground elev. 2,296 ft.

SOUTHEAST NEW MEXICO

Chaves County: Neville G. Penrose 1 A. L. Estate, 20-15s-31e. IPP 61 BOPD, 38°, Queen pay 3,139 ft. TD 3,145 ft.

Eddy County: Randel and Featherstone 1 McLean, 27-18s-30e. IP 72 BOPD, 36°, choke (?), top Queen pay 2,815 ft. TD 3,393 ft.

Lea County: Cactus Drilling Co. 1 Catron, 34-20s-36e. IP 65 BOPD, 12/64-in., 34°, low GOR, TP 100 psi. Seven Rivers 3,735 ft. TD 3,860 ft.

Wayne Moore and Chas. Turner 1 McQuinn, 8-18s-39e. IPP 66 BOPD, 36°, pay 5,030 ft. TD 6,500 ft.

KENTUCKY

Henderson County: Spencer Chemical Co. 2 Fee, NW SE NE 6-P-23. IPP 80 BOPD, lower Renault 2,452-58 ft. TD 2,677 ft. (New pay and extension to Wilson field.)

MICHIGAN

Saginaw County: J. V. Wicklund, Jr. 1 Morse, E½ SE NW 20-10n-6e, Dundee 2,512 ft. Pay 2,536-56 ft. IPP 25 BOPD. TD 2,598 ft. PBTD 2,565 ft. (New pay in Birch Run Berea oil pool.)

ARKANSAS

Union County: Wisinger & Wilfong 1 Ola Ray, ½ mile west of production in Lisbon field, C NE NE SE 5-17s-16w. IPF 30 BOPD, Nacatoch sand 2,067-2,110 ft., ⅛-in. choke. TD 2,110 ft. (Extension to Lisbon field.

OKLAHOMA

Beaver County: Cabot Carbon Co. 1 Hodges, C SW NE 1-5n-24eCM. IPF 846 BOPD, ½-in., 38°, GOR 250, Checkerboard lime 5,316-38 ft. TD 5,411 ft. (Oil discovery.)

O. H. Parker 1 Hennigh, NW NW 28-6n-28eCM. IPF 10 BDPD, 3,616 M.c.f. of gas per day, Morrow sand 6,081-91 ft., ⅜-in. choke, elev. 2,193 ft. (Gas distillate discovery). TD 6,315 ft.

KANSAS

Barber County: Purcell & Mull 1 Mahan-Tarr, C S½ SW 18-33-13w. IPP 161 BOPD, Marmaton lime, 4,588-94 ft. TD 4,846 ft. (Oil discovery.)

Decatur County: W. W. Sauvage 1 Jorn, IPP 15 BOPD, Lansing 3,567-71 ft. TD 3,748 ft. (Oil discovery.)

Pawnee County: Loffland Bros. 1 Grizzell, SW SW SE 23-23s-15w. IP 1,634 M.c.f. of gas per day, Simpson 4,084-88 ft., 4,100-10 ft. TD 4,150 ft. (Gas discovery.)

NEBRASKA

Kimball County: F. P. Zoch, Campbell & Love-Miller 1 Pound, NW NE 14-16n-54w. IPP 295 BOPD, "J" sand discovery. TD 5,825 ft. "J" sand.

UTAH

Grand County, Seiber Nose: Carter Oil Co. 1 Larsen-State, NE NW 2-20s-24e. IPF 126 BOPD, Morrison discovery, new field. TD 1,439 ft. Morrison.

Uintah County, Chapita Wells: Continental Oil Co. 2 Unit, NE NW SE 28-9s-23e. IP 4,618 M.c.f. of gas per day through 2-in. tubing, Wasatch discovery, new pay. TD 9,125 ft. Mancos.

COLORADO

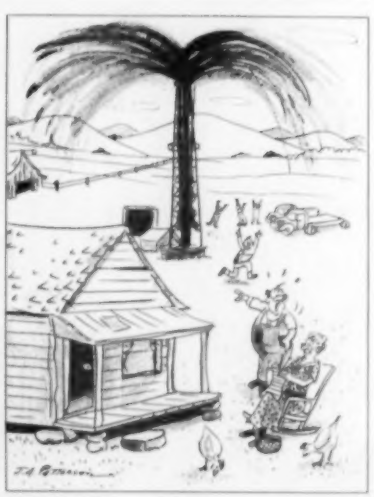
Adams County, Windy Hill: Lubar Oil Co. and Ryan-Davis 1 UPRR, SW SW SE 5-3s-57w. IPP 70 BOPD, 150 BWPD, "J" sand discovery, new field. TD 5,730 ft. "J" sand.

ALBERTA

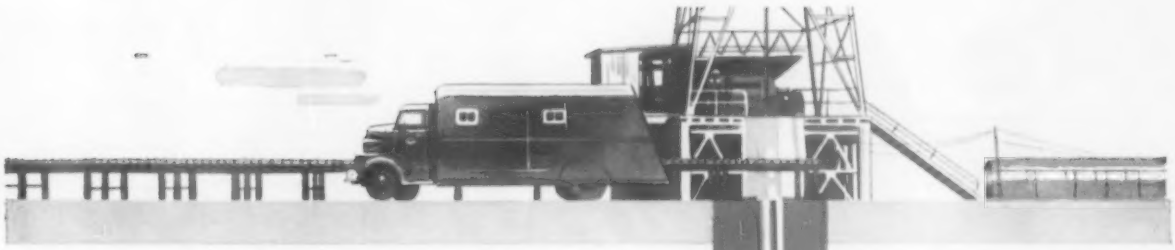
Husky-Union-Imperial 1 Cooking Lake, LSD 11, 22-52-22w4. D2 oil well. TD 4,115 ft.

Texas Pacific 1 Patterson, LSD 14, 4-51-22w4. Viking gas well. TD 4,441 ft.

Hudson's Bay-Oilwell Operators 1 Westward Ho, LSD 7, 8-33-4w5. Mississippian oil well. TD 8,913 ft.



"Is that all you've got to say, Ma, 'Lawsy me'"?



BAROID gives you all 9 factors for an accurate log of your well

Baroid mud-and-cuttings analysis provides a fast, accurate log of your well while the bit is making hole. You obtain well information simultaneously with the drilling operation. This continuing analysis assures you that every important trace of oil or gas will be detected, every possible pay zone discovered. Coring time can thus be reduced since only cores that count are taken at depths that the Baroid analysis shows oil and gas. Important on-location core analyses are made as part of your Baroid Well Logging Service.

Baroid Well Logging provides you with a dependable log of your well. You know whether oil or gas exists, you obtain microscopic studies of cuttings for porosity and lithology, you know the depth of hole, thickness of formations, the drilling rate, and the characteristics of the drilling fluid. You obtain an on-the-job, continuing picture of your well when you need it most.

Depend on Baroid for an accurate log of your next well. Mail coupon today for latest Well Logging Brochure.

1. Oil Shows
2. Analysis for Gas
3. Lithology
4. Porosity Studies
5. Formation Thickness
6. Depth of Hole
7. Drilling Rate
8. Mud Properties
9. On-location Core Analysis

BAROID WELL LOGGING SERVICE

Baroid

BAROID DIVISION
National Lead Company
Main Office: P. O. Box 1675, Houston 1, Texas

WELL LOGGING OFFICES – Shreveport, New Orleans, Corpus Christi, Houston, Midland, Oklahoma City, Los Angeles, Casper, Billings, and Salt Lake City

BAROID P. O. Box 1675, Houston 1, Texas
Please send me your latest Well Logging Brochure.

Name_____ Title_____

Company_____

Address_____

City_____ State_____

5088

if IT'S AN OIL LOAN

SEE "The Oil Bank of America"

if you have leases to handle
a well to drill
storage facilities to erect
a string of tools to buy

if you have a refinery, gasoline plant,
pipe line or pump station to build

if you have a building to erect
a plant to equip
repairs to make
a supply store to stock

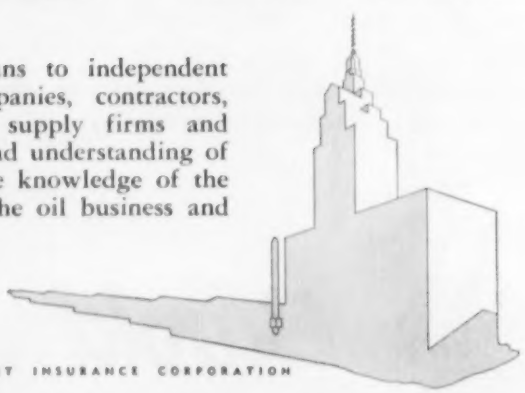
if you need a new truck, car or plane

if you want to establish a new enterprise

if you need money for these or any other
sound business requirements, see
your National Bank of Tulsa.

NATIONAL BANK OF TULSA
NBT

Through thousands of loans to independent operators, producing companies, contractors, equipment manufacturers, supply firms and others, this bank has a broad understanding of the operations and intimate knowledge of the financial requirements of the oil business and allied industries.



MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

NATIONAL BANK OF TULSA

The Oil Bank of America

OFFERING COMPLETE BANKING AND TRUST SERVICES

Andress Steps Up

Traffic expert moves into new Service executive spot

R. J. ANDRESS is a modest man about his new job as executive vice president of Service Pipe Line Co.

"I'm just a leg on a many-legged chair," Andress insists, "and who can say which leg on a chair is more important?"

The new job is a big change from his first contact with the oil business. That was back in 1931 when Andress, not long out of high school and facing the depression without a job, went to work as a stenographer in the Texas Legislature.

One of his early jobs was typing the preconference house-senate report on what soon became Texas' first effective proration law. The task whetted his interest not only in oil, but also in law and politics. The next year, while he was only 21, found him campaigning in Dallas for the legislature.

He wound up fourth in a field of 10. It was a good showing for a beginner, but it paid no money, so Andress went back to Austin and his typing and shorthand. When a friendly legislator formed a motor-transport company, Andress went along as secretary.

In time he began appearing for the company before the Texas Railroad Commission. It was this activity—plus a push by the legislature—which made him a legal expert in transportation.

The legislature passed a bill which would require a college degree or 3 years formal legal schooling for bar membership. In his work, Andress thought it essential to be a lawyer. So, to become a lawyer without having to go back to school, high-school-graduate Andress beat the deadline by spending the next 9 months in the law library of Texas Supreme Court. He took the bar examination and passed.

Andress was one Army officer who spent the war working at his specialty. As a transportation officer he won the Croix de Guerre and the Bronze Star for the rapid unloading of 160 ships on the southern coast of France without any port facilities and with improvised equipment. Three times he was called upon to open blocked and damaged ports to shipping.

He joined Service Pipe Line in 1946 and quickly learned to apply his basic transportation and legal knowledge to the pipeline industry. He was elected a director in 1948. His election as executive vice president fills a post vacant since J. L. Burke was advanced to the presidency in 1948. Andress formerly was vice president in charge of traffic.

As for hobbies, Andress says, "You might call me a tinker-around-the-houser." According to his wife, his specialty is starting projects. He now is taking up oil painting—"to encourage my daughter"—and is now-and-then plug fisherman. This is all in addition to a lot of reading and considerable travel.

At 44, Bob Andress is well up the oil-industry ladder for a man who is neither an engineer nor a college graduate.

He's a district vice president of the Association of Interstate Commerce Commission Practitioners, director of the Rocky Mountain Oil and Gas Association and chairman of its transportation committee, and chairman of the Shippers Oil Field Traffic Association.

C. L. Crenshaw has been named chief accountant by the Iraq Government for the new refinery which it will operate at Baghdad, Iraq. Crenshaw, a veteran of the oil industry, has spent the past 32 years in refineries. He served 14 years with the old Ouachita Valley Refining Co., El Dorado, Ark., 14 years with the old Shallow Water Refining Co., Garden City, Kans., and 4 years as manager of Berry Asphalt Co.'s plant at Stephens, Ark.

William Ormond White has been elected president of Trans-Tex Drilling Co. **George S. Buchanan,** former president of Trans-Tex, was reelected chairman of the board. Trans-Tex, which headquarters at Longview, Tex., is a wholly owned subsidiary of Husky Oil Co., Cody, Wyo. White has been in the oil business since 1934. He served with Louark Production Co. and later was division manager of the land department for Carter Oil Co.

John R. Suman, vice president and director of Standard Oil Co. (N. J.) since 1945, will retire March 31, after 44 years in the petroleum industry. Suman served the industry as an engineer, geologist, and executive. During his career, Suman was instrumental in developing the modern rotary rig and drilling equipment which enabled oil men to tap deeper formations. In the field of reservoir engineering, Suman assisted in pressure-restoration experiments. The results allowed recovery of up to 80 per cent of the oil in a producing formation instead of the normal average of 20 per cent. Suman began his oil career with Rio Bravo Oil Co. in 1912. He joined the Jersey group in 1927 as a director of Humble Oil & Refining Co. He served as Humble's vice president in charge of production from 1933 to 1945.

Richard P. Jeffery has been named maintenance superintendent of Great Northern Oil Co., St. Paul. A veteran in the oil industry, Jeffery had spent the past 22 years at Lemont, Ill., where Globe Oil & Refining Co. had a refinery. From 1935 to 1940 he was process supervisor at Lemont and for the past 14 years was maintenance superintendent in charge of plant maintenance and new construction.

Harold L. Williams, of Paleontological Laboratory at Midland, Tex., has been elected president for 1955 of the Permian basin section of the Society of Economic Paleontologists and Mineralogists. Other new officers are: **Virgil E. Barnes,** Bureau of Economic Geology, Austin, vice president; and **Hugh N. Frenzel,** with Ralph Lowe,

PERSONALS

Midland, secretary-treasurer. Committee chairmen include: **Berte R. Haigh,** Board for Lease of University Lands; **George T. Schmitt,** Sohio Petroleum Co.; and **Garner L. Wilde**, Humble Oil & Refining Co.

Edward G. Maddock has been elected a director and vice president of Cities Service Co. (Pa.), in charge of the marine division. Maddock succeeds **Christopher Story,** who resigned recently because of ill health. Maddock has been associated with Cities Service since 1930.

C. C. Crawford has joined Husky Oil Co. and will conduct studies for the company in the petrochemical field. Crawford, former president of Crawford Chemical Co., previously was with the chemical division of Phillips Petroleum Co.

E. Lindsay Semple has been named vice president and manager of crude-oil purchasing of Great Northern Oil Co. Semple, a veteran of 36 years of service with Interstate Oil Pipe Line Co., will headquarter at Regina, Sask.

Ralph C. Farley has returned to the Findlay, Ohio, offices of Ohio Oil Co. as assistant general superintendent of Ohio Oil Co. Farley recently finished a 21 months' special assignment in charge of production for the Tide Water Group in Saskatchewan. Before leaving on his Canadian assignment, Farley was division superintendent in Tulsa.

B. D. Lee and **K. C. ten Brink** have been promoted to assistant directors of research at the Bellaire, Tex., laboratories of The Texas Co. Before his promotion, ten Brink was assistant director of production research. Lee was assistant director of geophysical research. **A. S. McKay** and **J. C. Allen** have been appointed assistants to the director of research. Ten Brink began his Texaco career in 1947 as a chemical engineer. He was advanced to assistant director of production research in 1951. Lee started with the company in the geophysical division in 1932. He was appointed assistant director of geophysical research in 1948. McKay joined the company at Bellaire in 1949. Allen joined Texaco in 1946 as a research chemist.

G. R. Schoonmaker, Ohio Oil Co.'s district manager at Calgary, Alta., has been promoted to assistant manager of the foreign division of the company. Schoonmaker, a veteran of nearly 25 years with the company, did geologic work in Illinois, Indiana, Wyoming, Florida, and Guatemala before transferring to Alberta in 1949 when the company opened its Calgary office.

SCHOONMAKER

C. W. DONNELLY

S. B. WHITE

C. W. Donnelly, division geologist at Terre Haute, Ind., succeeds Schoonmaker. Donnelly joined Ohio at San Angelo, Tex., in 1937. He has been division geologist at Terre Haute for the past 5 years. **Stanley B. White,** district geologist at Casper, Wyo., succeeds Donnelly at Terre Haute. White joined Ohio in 1930 and has been at Casper twice for Ohio, the last time since 1953.

James H. Durbin, executive vice president of American Republics Corp., has been elected to the board of directors of Barber Oil Corp.

Kirk Jordan has been named to succeed **B. H. Vickrey** as district representative at Wichita Falls, Tex., for the Independent Petroleum Association of America. Jordan's district includes North and North Central Texas, the Texas Panhandle and Permian basin areas, and southern New Mexico. Vickrey recently was named membership director of I.P.A.A. at Tulsa.

C. V. Foster has been named senior chemical engineer in the petrochemical research division of the development and research department by Continental Oil Co. Other appointments in the department are **Paul A. Lobo,** named research chemical engineer in the petrochemical division; **Carlton L. Hassell,** appointed research mathematician in the production research division; **Calvin F. Meyers,** named senior research engineer in the product use laboratory; **Mary Ann Davis,** appointed junior chemist in the central research laboratories; **Robert L. Carden,** named junior chemist in the petrochemical research division; and **W. R. Beaty,** appointed junior chemical engineer in the process laboratory.

J. H. Todd, former manager of the exploration department of Standard Oil Co. of Texas, has been elected a director and vice president of the firm. Todd was with The California Co. in New Orleans from 1942 until last year when he joined Stanotex. **H. H. Kuester,** manager of the land and lease department, has also been elected a director and vice president of the company. Kuester has been with Stanotex since 1927. Kuester has also been elected a director and vice president of Pasotex Pipe Line Co., a subsidiary of Stanotex.

J. L. Rune, formerly vice president and general manager of Champlin Refining Co. at Enid, Okla., has been named senior vice president and executive assistant to the president of the Chicago Corp., parent firm of Champlin Refining. Rune will leave Enid for Chicago's Fort Worth office as soon as the company's new office building there is completed. **E. G. Wilmoth** is to replace Rune at Enid as general manager and vice president of Champlin. **H. N. Seevers** of Chicago's Fort Worth office has been promoted to vice president in charge of production. **L. A. Whitney,** formerly with Champlin at Enid, will move to Fort Worth as vice president of manufacturing for both Chicago and Champlin Refining.

E. E. Mayo has been named vice president of the recently organized Southern Pacific Pipe Lines, Inc., which will build a products pipeline from Los Angeles and El Paso into the Phoenix and Tucson areas. Mayo has been chief engineer of Southern Pacific Railway's lines west of El Paso since 1944.

J. P. Mooney has been renamed chairman of the refining committee in the petroleum division of American Society of Mechanical Engineers. Mooney is a member of the design department of the engineering division at Humble Oil & Refining Co.'s Baytown, Tex., refinery. **J. W. Young,** a member of the same department, has been named secretary of the committee.

PERSONALS

Harold S. Edwards has resigned as district geologist for Stanolind Oil & Gas Co. at Abilene, Tex., to join Ada Oil Co. as manager of that firm's new production, geological, and land district office in Abilene.

Billy G. Nippert, petroleum engineer with Arkansas Fuel Oil Corp., has been transferred from Olla, La., to Longview, Tex.

C. E. Long, geologist for Eastland Oil Co., Midland, Tex., for the past 2 years, will open consulting offices in Midland. Before joining Eastland, he was district geologist in Midland for Mid-Continent Petroleum Corp. and on the geological staff of Humble Oil & Refining Co.

Asa D. McRae has been transferred by Magnolia Petroleum Co. from district geologist at Mount Vernon, Ill., to Kansas district geologist at Wichita. **Harold J. Fitzgeorge,** former Abilene, Tex., district geologist, replaces McRae at Mount Vernon, and **Wayne H. Mack** is being transferred from the Jackson, Miss., geological office to replace Fitzgeorge at Abilene.

R. M. Love, chemical engineer with Humble Oil & Refining Co. in its technical and research division at the Baytown, Tex., refinery, has been promoted to section head. Other promotions announced by Humble include **O. H. Dawson,** named senior research chemist in the research and development division; **E. R. Gurtler,** advanced to technical specialist in the technical services division; and **D. C. Clark, Bartlett Johnston, J. T. Moody,** and **W. K. Roquemore,** promoted to senior chemical engineers.

A. M. Bell, Jr., has been appointed manager of exploration for Tulsa production division of Gulf Oil Corp. Bell joined Gulf in 1925 after receiving a B. S. degree in geology from Yale University. He worked as a roustabout in the old Cromwell field for a short time and then transferred to Wichita as a scout. In 1933, he was promoted to assistant general superintendent of production. In 1951, Bell was transferred to the executive department as crude oil supply and disposition advisor. **Jed Maebius** has been appointed assistant manager of exploration with Gulf at Tulsa. He was employed originally in Saginaw, Mich., and later appointed zone geologist in Michigan. He was moved to Tulsa in 1945 as staff geologist, and was then appointed zone geologist in Casper, Wyo. In 1952, he returned to Tulsa as chief exploration geologist, and in 1954 was appointed chief geologist for Tulsa production division.

John E. Stuchell, veteran of 38 years of service with New York State Natural Gas Corp., has been named superintendent of the firm's newly created Harrison district.

C. C. O'Boyle, geological engineer, has joined **A. E. Brainerd** and **F. M. Van Tuyl,** independent petroleum, economic, and engineer geology consultants at Denver.

Kenneth Newton has resigned a position on the geological staff of Statex Exploration Co. in Midland, Tex., to join Plymouth Oil Co. as district geologist at Midland.

S. H. Bennion, Idaho Falls, Idaho, has been named president of Wesco Refining Co., Rangely, Colo. Other officers of the firm are **Henry Ricci,** Salt Lake City, general manager; **Lawrence Merkley,** Rangely, refinery superintendent; and **Russell Fidler,** Rangely, comptroller.

Fred S. Wright, Jr., formerly petroleum engineer for Magnolia Petroleum Co.'s West Texas division at Midland, has been promoted to assistant general superintendent of the company's part-interest operations department at Dallas. **H. K. Holland, Jr.,** division engineer for the Oklahoma division at Oklahoma City, has been transferred to Midland to replace Wright. **D. F. Pendley, Jr.,** assistant division petroleum engineer for the Oklahoma division, moves up to fill Holland's former position, and **William A. Daniel,** district engineer at Kermit, Tex., is being moved to Oklahoma City to take over as assistant division engineer. **V. M. Leonard,** district engineer at Duncan, Okla., is being transferred to Kermit in the same capacity. **Charles L. Barney,** engineer in the Pegasus district, has been promoted to district petroleum engineer at Duncan. Other Magnolia changes in the petroleum-engineering department include: **Archie M. Speir** from petroleum engineer at Lake Charles to senior petroleum engineer at Gulf Coast division office at Houston; **W. L. Morris** from the engineering department at Kermit to the producing division as assistant production foreman there; **Forrest D. Musson, Royal J. Christensen,** and **A. J. McCredie** from junior petroleum engineers to petroleum engineers at Brownfield, Tex., Electra, Tex., and Oklahoma City, respectively.

Robert L. Kylander has been promoted to staff engineer by Continental Oil Co. in its petrochemical department at Houston. He had been serving as process and sales engineer at Conoco's Baltimore petrochemical plant. **Robert E. Maples** has been named to succeed Kylander at Baltimore. Maples has been with Conoco since 1954.

W. J. Williamson has been named secretary and a director of Shell Pipe Line Corp. He succeeds **A. E. Groff,** who retired. Williamson has been serving with the Shell companies since 1941. Groff, a veteran of 31 years of service with Shell firms, was named secretary of the pipeline company in 1940. He was named a director in 1951.

Sir William Fraser, chairman of the board of British Petroleum Co., Ltd., has chosen the title of Lord Strathalmond of Pumpherston for the Barony he received in Britain's New Year Honor's List. Lord Strathalmond's title recalls his connection with the Scottish shale-oil industry. The River Almond flows through the Scottish shale fields and "Strath" is a Gaelic term meaning valley. Early in his career Lord Strathalmond coordinated the production of various Scottish shale-oil companies. His father founded a shale-oil firm called Pumpherston Oil Co., where Lord Strathalmond began his career.

Kenneth R. Joynt has been promoted by Magnolia Petroleum Co. from superintendent of the company's Pegasus producing district in Midland and Upton counties, West Texas, to assistant superintendent of its Oklahoma producing division at Oklahoma City. **Cletus H. Samples,** assistant superintendent of the Pegasus producing district, has been promoted to superintendent to replace Joynt.

F. L. Whitney, Jr., Monsanto Chemical Co., St. Louis, has been elected president of the National Association of Corrosion Engineers. Other officers elected are **W. F. Fair, Jr.,** Tar Products Division of Koppers Co., Inc., Westfield, N. J., vice president; **R. A. Brannon,** Humble Pipe Line Co., Houston, sixth term as treasurer; **Robert R. Pierce,** Pennsylvania Salt Manufacturing Co., Philadelphia, corporate mem-

PERSONALS

ber director; **C. G. Munger,** Amercoat Corp., South Gate, Calif., corporate member director; and **W. H. Stewart,** Sun Pipe Line Co., Beaumont, Tex., active member director.

Victor H. King, seismologist for Atlantic Refining Co., has been transferred from the Wyoming area to Houston.

J. D. McConnell, Sinclair Pipe Line Co., Independence, Kans., has been elected to the board of directors of Platte Pipe Line Co. McConnell succeeds **H. L. Phillips,** who retired.

Charles E. Altman has been appointed superintendent of New York State Natural Gas Corp.'s newly named Sabinsville district. The district is the former northern district of which Altman was assistant superintendent.

Gerald J. Smith and **Earl V. Hewitt** have been elected to directorships in Pan American companies. Smith, a

GERALD J. SMITH

EARL V. HEWITT

geologist who is administrative vice president of Pan American Production Co., was elected to the board of Pan American Production Co. Hewitt, operating vice president of the production company and Pan American Gas Co., was elected to the board of directors of the gas company.

J. Herbert Sawyer has resigned as eastern division geologist of Creole Petroleum Corp. at Caripito, Venezuela, to become exploration manager of Esso Standard Oil, S.A., at Havana, Cuba. **P. P. Wolcott** succeeds Sawyer in Venezuela.

D. F. Edwards has been named general superintendent by Esso Standard Oil Co. at its Bayonne refinery. He succeeds **Bill Wadt,** who has been named assistant to the manager of the New York sales division. **Warren C. Wilson,** assistant general superintendent at Bayway refinery, has been moved to Bayonne as assistant general superintendent, the position formerly held by Edwards.

Tyler Brinker, engineer with Union Oil Co. of California at Whittier, Calif., has been transferred to Houston.

Richard R. Evans, production engineer with Sunray Oil Corp., has been transferred from Tulsa to Hope, Ark.

Alfred G. Catlow has joined Carleton D. Speed, Jr., Houston, as a geologist. Catlow, a graduate of the University of Texas, will work in Texas and Louisiana.

Joseph R. Ault, former gravity computer with Carter Oil Co., at Piura, Peru, has been transferred to the company's home offices in Tulsa as an engineer.

E. T. Asplundh has been elected a director of Southern Minerals Corp., Corpus Christi, Tex. Asplundh is president of Columbia-Southern Chemical Corp. and a director of Pittsburgh Plate Glass Co.

Gordon Kirby has been named division manager of the recently formed Billings division of Murphy Corp. The new division consists of company operations in Montana, North Dakota, South Dakota, and the Big Horn and Powder River basins in Wyoming. **T. D. Langford,** former assistant to the president, has been transferred to Billings as assistant division manager. **R. L. Grady** has been named to head the newly formed Denver division. The division was formed by merging the Denver and Midland districts.

F. G. White has been promoted by Magnolia Pipe Line Co. from district superintendent of the company's North Basin district at Brownfield, Tex., to assistant division superintendent of the Northern division at Oklahoma City. **A. W. Butler,** formerly assistant superintendent of the North Basin district, has been moved up to superintendent replacing White.

Vance K. Sharpe has been promoted from division superintendent of the northern division to assistant production superintendent in the Tulsa office by Kewanee Oil Co. Sharpe joined Kewanee as a clerk at Maljamar, N. M., in May 1945. He was later made chief clerk and transferred to Odessa in the West Texas division office. In December 1947, he was named district superintendent in charge of the Odessa district. In 1950, he became division superintendent at Shidler, Okla.

DEATHS

William Greenley, 43, newly appointed assistant manager of the public relations department of Standard Oil Co. of California, died March 1 on an airplane bound for Lima, Peru, from Panama City, Panama. Greenley had been traveling assistant to T. S. Petersen, president of Stancal for several years. Petersen was aboard the plane when Greenley died in his sleep.

Clarence S. Hudgins, 72, retired Gulf Oil Corp. employe, died in Fort Worth March 6. Hudgins, prior to his retirement, spent 16 years with Gulf at Sweetwater, Tex., as superintendent of the company's recently closed refinery. Hudgins retired in 1945 after 38 years with the company.

Carter Sheridan Bailes, 68, a director of Hancock Oil Co., died recently in Long Beach after a heart attack. Bailes entered the oil business in 1915 as a member of a drilling crew in Kern County, California. He joined Hancock in 1928 as superintendent of production. He was named a director of the company in 1935.

Sir Andrew Agnew, 73, former manager of Shell Transport & Trading Co., died March 4, at New Galloway, Scotland. Sir Andrew retired last year after 50 years with the Royal Dutch-Shell Group. As wartime chairman of the Petroleum Board in Great Britain, he was largely responsible for the underwater pipeline across the English Channel that supplied fuel for the Allied advances in 1944-45.

Lewis C. Link, 54, West Texas operator, died March 6 at his ranch near Strawn, Tex. Link entered the oil business in 1925 with Texas Pacific Coal & Oil Co. at Thurber, Tex. He moved to Midland, Tex., in 1931. He became an independent operator in 1937.

Charles J. Gregg, 71, retired Appalachian district sales manager with Dresser Manufacturing Division, Dresser Industries, Inc., died recently at his home in Bradford, Pa.

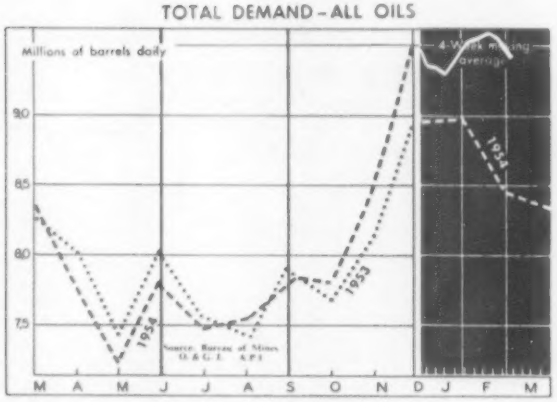
Vaughn George Hutchins, 69, California independent producer, died in a Los Angeles hospital recently.

Latest Figures . . . Industry Trends

A QUICK LOOK AT THE HIGHLIGHTS

	LATEST WEEK	Change from WEEK AGO		Change from YEAR AGO	
Production	6,804,775	UP	23,625	UP	305,890
Crude stocks	259,930,000	UP	877,000	DOWN	4,331,000
Completions	1,013	DOWN	33	UP	48
Refinery runs	7,462,000	DOWN	211,000	UP	511,000
Gasoline stocks	182,343,000	UP	1,033,000	UP	4,780,000
Distillate stocks	65,932,000	DOWN	2,717,000	DOWN	1,632,000
Four-product stocks	311,446,000	DOWN	3,038,000	DOWN	58,000
Total imports	1,377,600	DOWN	129,700	UP	264,100

TOTAL DEMAND – ALL OILS



First-Quarter Gain in Gasoline Stocks Will Set New Record

GASOLINE stocks have been climbing faster since the first of the year than in any comparable period of the past. With only 9 weeks of the first quarter accounted for, refiners already have put almost as much gasoline in storage as in the largest full first-quarter period.

The record for first-quarter gains in gasoline stocks is held by 1953 when inventories jumped 26,609,000 bbl. The accompanying table shows first-quarter stock records back through 1949. For the period prior to 1949, the record was in 1940 with a gain of 20,845,000 bbl. in the first quarter.

Weekly A.P.I. stock reports show 182,343,000 bbl. of finished and unfinished gasoline in storage on March 4 compared with 157,228,000 bbl. on December 31, 1954. This represents a gain of 25,115,000 bbl. for the 9-week period compared with 23,425,000 bbl. for the full first quarter of last year and with the record first-quarter gain of 26,609,000 bbl. in 1953.

The Bureau of Mines reported actual inventories of finished and unfinished gasoline for January 1 at 155,400,000 bbl. or 1,800,000 bbl. less than the preliminary weekly figures by A.P.I. If the weekly figures are now comparable with the Bureau of Mines, the gain for the first quarter to date actually is 26,915,000 bbl.

Most suppliers agreed that gasoline stocks were too high last year, both at the first of the year and at the start of the gasoline season. The outlook was brighter at the start of 1955 with gasoline stocks about 2,500,000 bbl. less than a year earlier. Most of this advantage has been lost through excessive gasoline production in the first 2 months of the year.

Early-season gasoline markets will be determined by refinery production in March. In the postwar period, additions to gasoline storage in March have ranged from less than 1,000,000 bbl. in 1950 to 8,800,000 bbl. in 1952. If refiners will hold gasoline production down to actual demand for the remaining weeks in March, stocks at the end of the quarter will not be high enough to break the gasoline market.

On the other hand, if gasoline stocks gain another 8,000,000 bbl. by the end of March, there is little chance that present gasoline prices will hold.

Even at current prices, refiners' profits from gasoline will be lower in the coming months under announced plans for higher-octane gasolines.

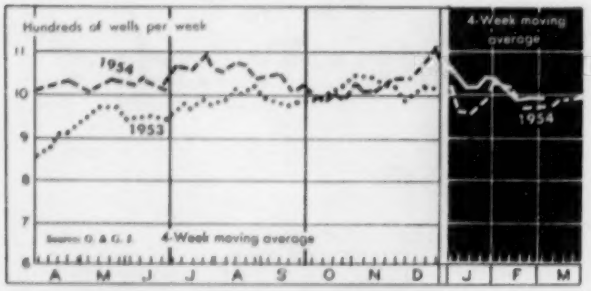
Recent extensions of gasoline price wars in the New England states indicate continuing pressure from excessive gasoline supply. Low prices also have been reported for Mississippi River terminals.

CHANGES IN GASOLINE STOCKS—FIRST QUARTER
(Thousands of barrels)

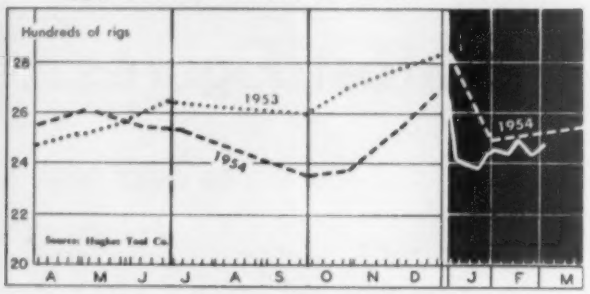
	Gasoline stocks— Jan. 1	March 31	Increase
1949	103,756	127,443	23,687
1950	111,443	133,766	22,323
1951	*124,447	*149,679	25,232
1952	134,867	160,689	25,822
1953	†134,737	†161,346	26,609
1954	157,872	181,297	23,425
	12-31-54	3-4-55	Increase
1955	157,228	182,343	25,115

*New basis to include additional terminal stocks. †Excludes jet-fuel components.

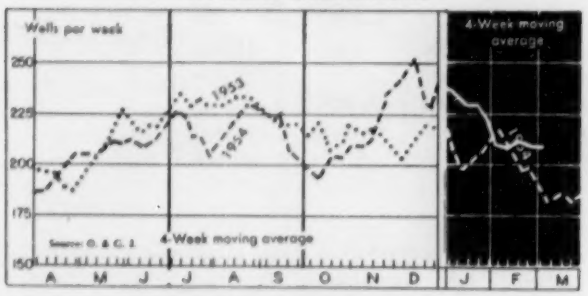
TOTAL COMPLETIONS



ROTARY RIGS OPERATING IN UNITED STATES



WILDCAT COMPLETIONS



ACTIVE ROTARY RIGS*

Area—	3-7-55	Change from 2-28-55	Change from 3-8-54
Gulf Coast	552	9	47
N. and W. Texas-New Mexico	845	39	54
Arkansas-N. Louisiana-E. Texas	166	12	—30
Oklahoma	307	21	—84
Kansas-S. Nebraska	179	—5	10
Illinois-Eastern	96	—10	—25
Rocky Mountain	193	—2	—47
Pacific Coast	147	—3	—8
Total United States	2,485	61	—83
Western Canada	200	2	45

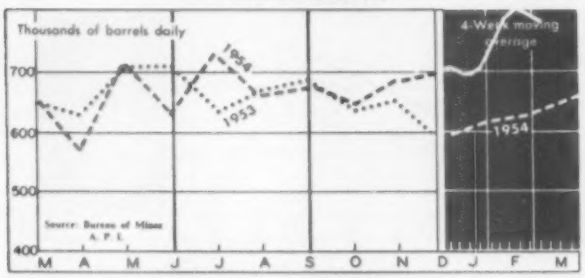
*Hughes Tool Co.

WEEKLY WELL COMPLETIONS . . .WEEK ENDED MARCH 5, 1955

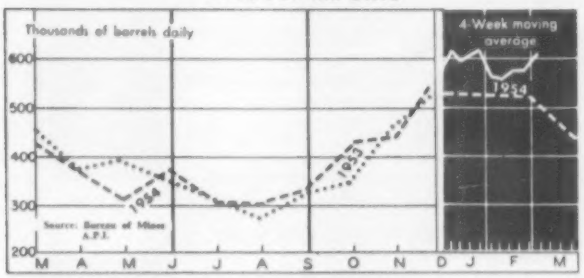
	Total of all wells: Comp.	Oil	Gas	Dry	Footage	Cum. 1955	Cum. 1954	Wildcat completions and discoveries: Oil	Dist.	Gas	Dry	Total	Cumulative total, 1955: Oil	Dist.	Gas	Dry	Total
Ala.-Ga.-Fla.	3	0	0	3	8,683	23	23	0	0	0	3	3	0	0	0	22	22
Arkansas	9	3	0	6	22,744	87	112	1	0	0	3	4	7	0	0	23	30
California	*96	79	2	15	481,648	403	441	0	0	0	10	10	5	0	1	62	68
Colorado	32	10	0	22	183,877	219	190	1	0	0	16	17	9	0	5	105	119
Illinois	68	38	0	30	170,667	673	449	0	0	0	7	7	11	0	0	82	93
Indiana	12	5	0	7	17,954	119	144	0	0	0	2	2	3	0	0	45	48
Kansas	112	66	12	†34	400,806	875	705	2	0	1	6	9	26	0	6	136	168
Kentucky	28	12	7	9	64,852	228	190	1	0	0	6	7	9	0	2	41	52
Louisiana	65	49	2	14	283,115	665	538	0	0	0	6	6	22	10	5	63	100
North	44	41	0	3	93,574	358	263	0	0	0	2	2	3	2	1	28	34
South	21	8	2	11	189,541	307	275	0	0	0	4	4	19	8	4	35	66
Michigan	15	4	0	11	45,106	111	113	1	0	0	7	8	2	0	0	44	46
Mississippi	13	6	0	7	103,999	78	58	0	0	0	5	5	1	0	0	29	30
Montana	7	4	0	3	28,729	66	47	0	0	0	1	1	1	0	0	19	20
Nebraska	11	3	0	8	64,483	95	67	1	0	0	3	4	6	0	0	47	53
New Mexico	28	20	6	2	119,800	191	248	4	0	0	1	5	7	1	0	14	22
Northwest	6	0	6	0	17,362	48	73	0	0	0	0	0	1	0	0	3	4
Southeast	22	20	0	2	102,438	143	175	4	0	0	1	5	6	1	0	11	18
North Dakota	3	2	0	1	23,000	30	33	0	0	0	1	1	0	0	0	5	5
Ohio	21	10	4	‡7	43,223	180	171	0	0	0	0	0	0	0	2	5	7
Oklahoma	138	96	2	40	464,240	1,324	1,572	1	1	0	11	13	20	4	4	103	131
Pennsylvania-New York	34	10	10	§14	75,170	309	424	0	0	0	0	0	0	0	4	3	7
Texas	292	176	11	105	1,224,111	3,179	3,021	11	0	5	58	74	124	13	21	674	832
Southwest (1 & 4)	47	28	4	15	157,992	506	448	3	0	3	9	15	19	5	7	122	153
Gulf Coast (2 & 3)	39	17	4	18	226,389	441	467	1	0	1	8	10	13	8	11	116	148
East (5 & 6)	14	6	1	7	63,170	190	127	0	0	0	0	0	7	0	0	50	57
North Central (7-B & 9)	106	59	0	47	334,222	1,044	1,107	6	0	0	30	36	62	0	0	262	324
West (7-C & 8)	76	58	1	17	411,176	818	725	1	0	1	11	13	23	0	2	121	146
Panhandle (10)	10	8	1	1	31,162	180	147	0	0	0	0	0	0	0	1	3	4
Utah	3	1	2	0	16,943	11	10	1	0	1	0	2	2	0	2	4	8
West Virginia	12	2	7	3	31,181	113	95	0	0	0	2	2	0	0	2	5	7
Wyoming	9	4	0	5	45,717	160	274	0	0	0	3	3	3	0	1	29	33
Miscellaneous (Idaho, Nev.)	2	0	0	2	9,387	7	50	0	0	0	2	2	0	0	0	7	7
Total United States	**1,013**	600	65	348	3,929,435	9,146	8,975	24	1	7	153	**185**	258	28	55	1,567	1,908
Total previous week	1,046	564	58	424	4,193,738			29	4	8	186	227	234	27	48	1,414	1,723
Total March 6, 1954	965	529	60	376	3,825,051			18	5	6	138	167	239	30	60	1,549	1,878

Service wells included: †2, ‡1, §8. *California includes week of January 29, 1955.

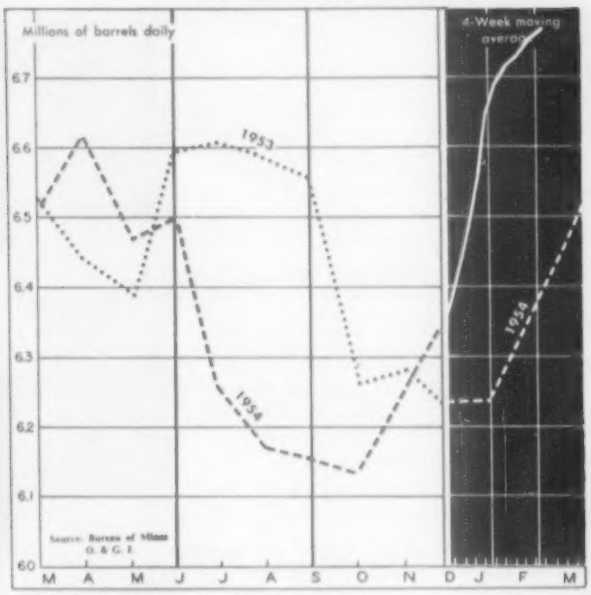
CRUDE IMPORTS



PRODUCT IMPORTS



CRUDE-OIL PRODUCTION

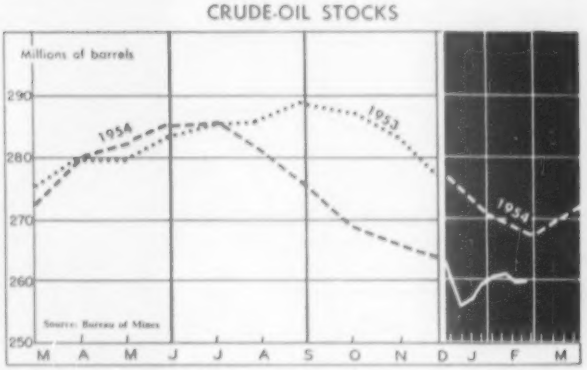


DAILY AVERAGE PRODUCTION FOR WEEK

	March 5 — Crude oil	March 5 — Lease condensate	March 5 — Total	Feb. 26 total
Alabama	4,200		4,200	4,200
Arkansas	73,800	450	74,250	73,450
California	969,000		969,000	966,900
Colorado	142,100		142,100	142,800
Eastern	48,500		48,500	48,500
Florida	1,400		1,400	1,450
Illinois	212,600		212,600	211,000
Indiana	29,300		29,300	29,100
Kansas	331,600		331,600	331,000
Kentucky	39,600		39,600	40,100
Louisiana	655,025	53,100	708,125	706,800
North	107,300	3,100	110,400	109,800
South	547,725	50,000	597,725	597,000
Michigan	32,100		32,100	31,500
Mississippi	90,800	5,000	95,800	94,875
Montana	41,900		41,900	41,400
Nebraska	27,400		27,400	27,700
New Mexico	221,825	4,450	226,275	223,075
North Dakota	29,400		29,400	28,600
Oklahoma	563,800		563,800	577,500
Texas	2,903,075	52,950	2,956,025	2,933,800
Dist. 1	50,350	600	50,950	50,000
Dist. 2	150,150	8,200	158,350	157,100
Dist. 3	452,850	24,675	477,525	475,075
Dist. 4	255,425	5,900	261,325	258,075
Dist. 5	48,375	525	48,900	48,050
Dist. 6	125,500	5,675	131,175	129,100
East Texas field	236,850		236,850	236,000
Dist. 7-B	141,725	50	141,775	140,050
Dist. 7-C	187,000	4,600	191,600	187,700
Dist. 8	973,425	2,025	975,450	972,000
Dist. 9	194,575	650	195,225	194,575
Dist. 10	86,850	50	86,900	86,075
Utah	4,700		4,700	4,500
Wyoming	266,300		266,300	262,600
Others	‡400		‡400	‡300
Total U. S.	6,688,825	115,950	**6,804,775**	6,781,150
Change from previous week, up			**23,625**	
Canada	†269,400		†269,400	†333,200
Total U. S. production January 1-March 5				429,299,275 bbl.
Same period last year (crude plus cond.)				*404,577,100 bbl.

*Includes 3,586,200 bbl. condensate. †Week ended previous Monday. ‡Includes S. D. 200, Nev. 200.

CRUDE-OIL STOCKS



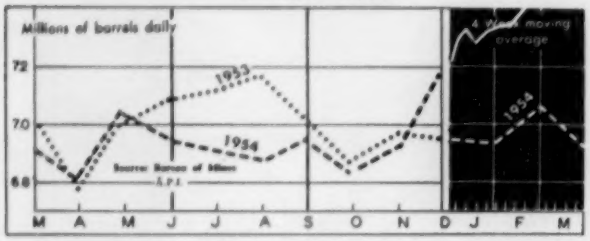
CRUDE-OIL STOCKS BY STATES OF ORIGIN*

(Thousands of barrels)

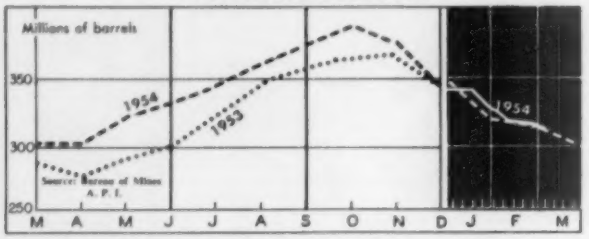
	Feb. 26, '55	Feb. 19, '55	Feb. 27, '54
Pennsylvania Grade	2,821	2,975	2,704
Other Appalachian	1,903	1,715	1,742
Illinois, Indiana, Michigan	11,471	11,338	12,004
Nebraska, North Dakota	1,869	1,792	(1)
Kansas	8,387	8,737	9,892
Oklahoma	23,530	23,576	26,516
Arkansas	3,003	3,108	2,972
Louisiana	14,604	14,404	14,323
North	2,336	2,321	2,612
South	12,268	12,083	11,711
Mississippi	3,137	3,409	3,307
New Mexico	8,546	8,356	8,013
Texas	117,727	118,187	121,049
East Texas proper	10,330	10,222	11,015
West Texas	51,649	51,491	51,835
Texas Gulf	23,920	23,267	24,514
Other Texas	31,828	33,207	33,685
Wyoming	13,996	14,054	13,444
Other Rocky Mountain	5,378	5,174	3,130
California	32,004	32,125	33,871
Foreign	†11,554	10,103	11,294
Total	259,930	259,053	264,261

*Bureau of Mines. †Includes 3,256,000 bbl. in California. ‡Included with Kansas.

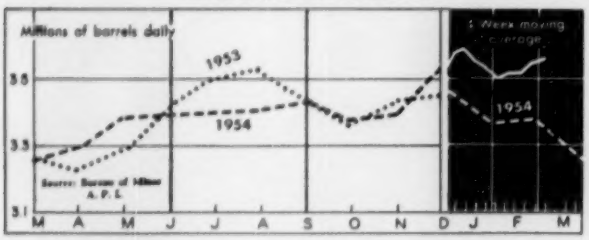
REFINERY RUNS



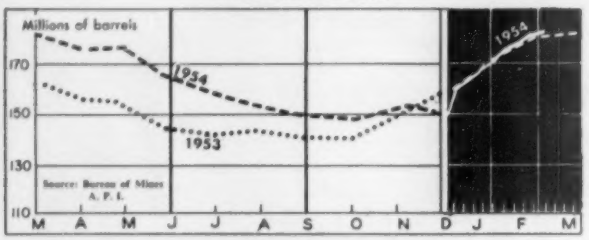
FOUR-PRODUCT STOCKS



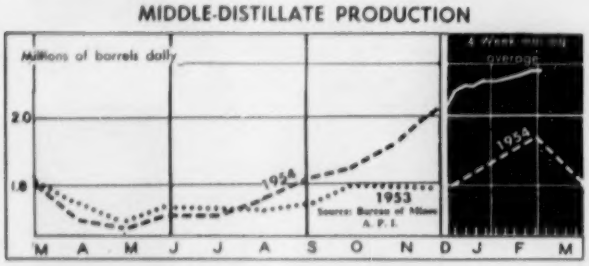
GASOLINE PRODUCTION



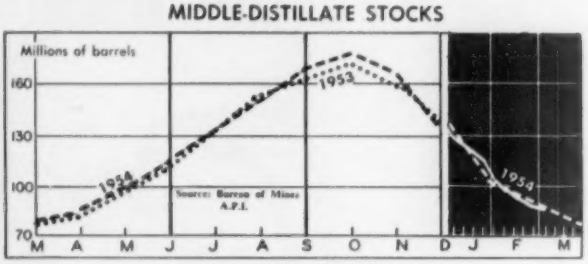
GASOLINE STOCKS



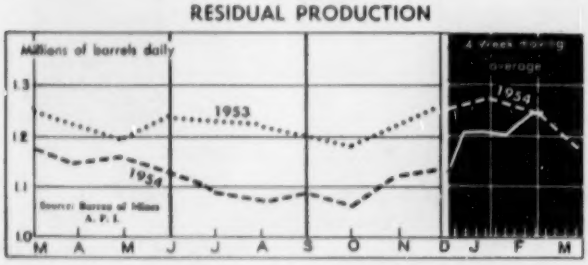
MIDDLE-DISTILLATE PRODUCTION



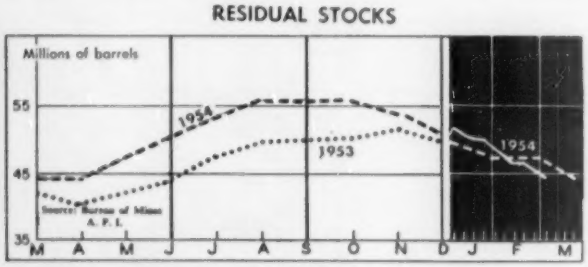
MIDDLE-DISTILLATE STOCKS



RESIDUAL PRODUCTION



RESIDUAL STOCKS



A.P.I. REFINERY REPORT, MARCH 4

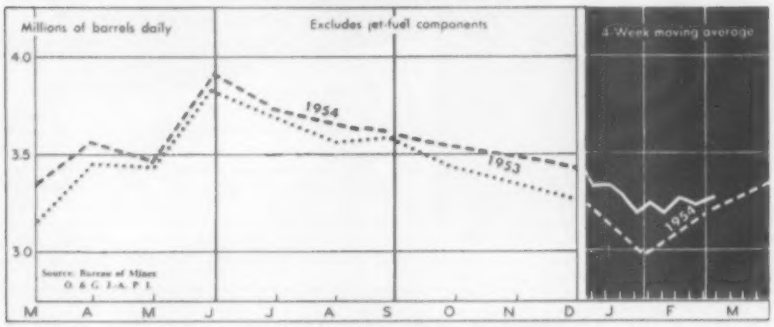
(Excludes all jet-fuel components)

(Thousands of barrels)

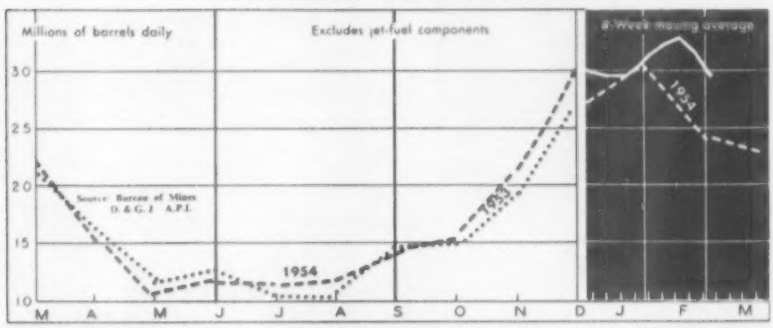
District—	Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.	Stocks‡ Gaso.†	Kero.	Dist.	Resid.	Bureau of Mines, March 1954 Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.
East Coast	1,045	417.4	47.3	314.3	232.9	35,371	8,041	22,705	7,883	1,021	410.7	32.1	256.3	212.1
Appalachian:														
District 1	98	40.1	4.7	25.6	9.7	4,955	482	1,619	321	100	41.7	5.3	21.4	12.9
District 2	97	49.6	9.0	20.3	14.7	2,479	254	519	172	94	47.9	6.6	17.2	14.4
Ind., Ill., Ky.	1,406	675.8	76.3	303.7	182.4	40,800	4,723	10,639	2,822	1,274	662.6	73.3	240.3	175.4
Okla., Kans., Mo.	668	357.9	15.3	176.6	51.0	19,359	973	142	1,093	582	335.3	16.6	133.4	44.1
Inland Texas	263	179.9	11.0	43.1	20.0	6,723	309	968	1,264	244	167.0	10.5	43.0	27.8
Texas Gulf Coast	1,915	844.4	109.7	566.1	243.0	26,335	1,848	6,254	4,347	1,694	760.7	141.9	383.9	230.8
La. Gulf Coast	624	296.6	60.5	120.9	33.9	12,475	1,241	2,882	1,203	559	246.4	45.7	143.2	45.2
N. La. and Ark.	87	31.4	8.6	21.6	6.3	4,145	469	1,177	162	90	36.8	8.6	21.6	7.0
Rocky Mountain:														
New Mexico	19	10.6	1.0	2.7	2.7	174		83	32	19	12.2	.8	3.2	2.5
Other Rocky Mtn.	246	117.9	1.6	63.1	37.7	8,142	175	1,984	701	234	110.8	3.7	54.2	40.0
California	944	486.0	2.7	168.3	346.1	21,385	358	9,960	24,298	1,012	428.9	7.9	140.5	356.3
Mar. 4, 1955	7,462	3,507.6	347.7	1,826.3	1,180.4	182,343	18,873	65,932	44,298	6,923	3,261.0	353.0	1,458.2	1,168.5
Feb. 25, 1955	7,673	3,621.3	364.3	1,843.4	1,272.7	181,310	18,791	68,731	45,652					
Mar. 6, 1954	6,951	3,377.9	407.3	1,505.1	1,170.7	177,563	19,512	67,564	46,865					

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipelines.

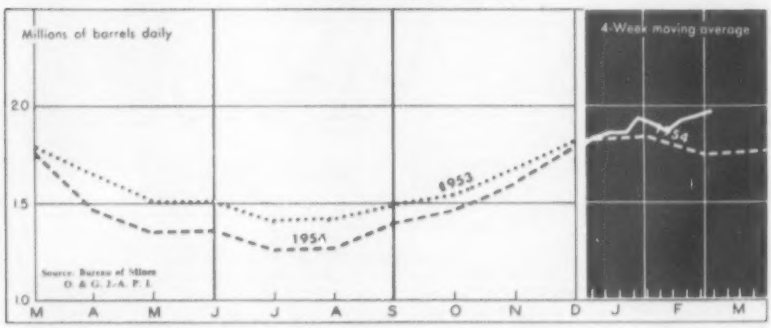
TOTAL GASOLINE DEMAND



TOTAL MIDDLE-DISTILLATE DEMAND



TOTAL RESIDUAL DEMAND



REPRESENTATIVE QUOTATIONS

Spot-market quotations of leading suppliers as of March 9, 1955. Prices are in cents per gallon, except for residual in dollars per barrel and wax in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Texas Gulf Coast
Regular gasoline	10.25-11	11.25-12	10.50-10.75
Premium gasoline	11.25-12	13-13.75	11.50-11.75
42-44 w.w. kerosine	9.5-9.75	10.6-10.7	9.5-9.75
No. 2 straw fuel oil	8.75-9.0	9.95	9.0-9.25
No. 6 residual	$1.50-1.60	$2.30-2.45	$1.95-2.00

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	4.5	4.0	4.25
Grade 18-55	5.4	4.9	5.15

LUBRICATING OILS

Mid-Continent

150-160 vis., D bright stock, 0-10 pp.	18
200 vis., No. 3 neutral, 0-10 pp.	13.25

WAX

Mid-Continent

132-134 A.M.P.	6.0

• Regular gasoline is reported to be available on the Mississippi River at prices low enough to deliver the material in Chicago at costs comparable with gasoline from the Mid-Continent sold for 9.25 cents a gallon plus pipeline charges. Residual fuel is firm on the Group 3 market.

PRODUCTION AND DEMAND—MAJOR PRODUCTS

(Thousands of barrels daily)

	Refinery prod.	Total demand
Gasoline:		
Four weeks ended 3-4-55	3,554	3,262
December 1954	3,605	3,455
February 1954	3,365	3,182
March 1954	3,261	3,331
Middle distillate:		
Four weeks ended 3-4-55	2,179	2,918
December 1954	2,049	3,122
February 1954	1,957	2,417
March 1954	1,811	2,240
Residual fuel:		
Four weeks ended 3-4-55	1,241	1,978
December 1954	1,187	1,820
February 1954	1,241	1,753
March 1954	1,169	1,667

SUPPLY AND DEMAND*

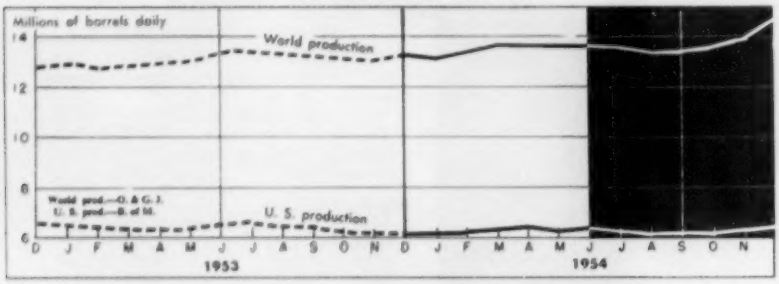
(Thousands of barrels daily)

	Year 1954	Dec. 1954	Dec. 1953
Domestic demand	7,752	9,279	8,551
Gasoline	3,393	3,363	3,150
Kerosine	324	591	564
Distillate	1,442	2,447	2,044
Residual	1,431	1,744	1,739
Jet fuel	126	117	114
Lubricants	105	96	98
L.P.G.	319	439	404
Other products	581	443	425
Crude loss	31	39	13
Exports	356	342	391
Gasoline	94	92	99
Kerosine	13	6	23
Distillate	67	68	87
Residual	73	76	64
Jet fuel			
Lubricants	42	43	42
L.P.G.	11	13	11
Other products	19	18	21
Crude	37	26	44
Total demand	8,108	9,621	8,942
Gasoline	3,487	3,455	3,249
Kerosine	337	597	587
Distillate	1,509	2,515	2,131
Residual	1,504	1,820	1,803
Jet fuel	126	117	114
Lubricants	147	139	140
L.P.G.	330	452	415
Other products	600	461	446
Crude exp. and loss	68	65	57
Stock change	—29	—1,191	—908
Crude	—44	— 199	—206
Products	15	— 992	—702
New supply	8,079	8,430	8,035
Imports	1,052	1,301	1,107
Crude	656	729	598
Products	396	572	509
Production	7,027	7,129	6,928
Crude	6,346	6,394	6,237
Nat. gasoline, etc.	681	735	691
Runs to stills	6,958	7,238	6,964

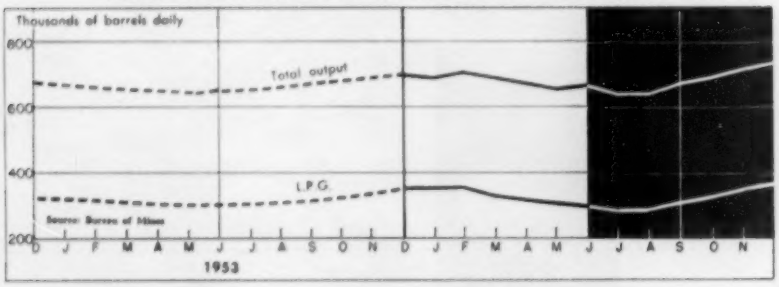
*Bureau of Mines.

(The schedule of selected crude prices appeared on page 200 of the March 7 issue and will be printed again next week.)

CRUDE-OIL PRODUCTION



NATURAL-GASOLINE AND CYCLING-PLANT PRODUCTION



PRODUCTION AT NATURAL-GASOLINE AND CYCLING PLANTS

(Thousands of barrels daily)

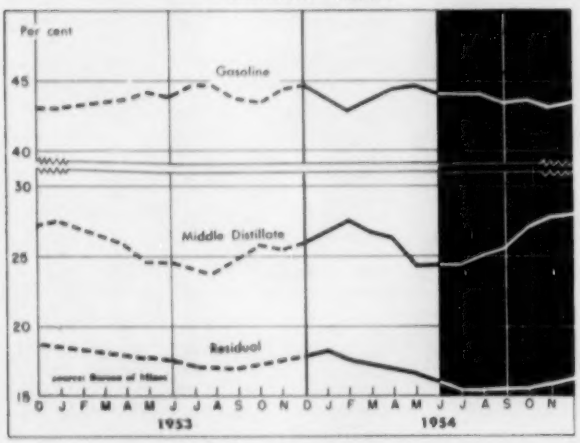
Month—	L.P.G.	Total
December 1954	372	733
November 1954	360	723
October 1954	332	692
April 1954	313	661
December 1953	348	700

CRUDE PRODUCTION

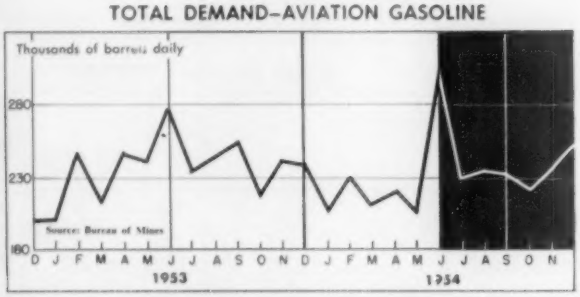
(Thousands of barrels daily)

Month—	U.S.	World
December 1954	6,394	14,262
November 1954	6,346	13,687
October 1954	6,135	13,432
April 1954	6,615	13,609
December 1953	6,238	13,241

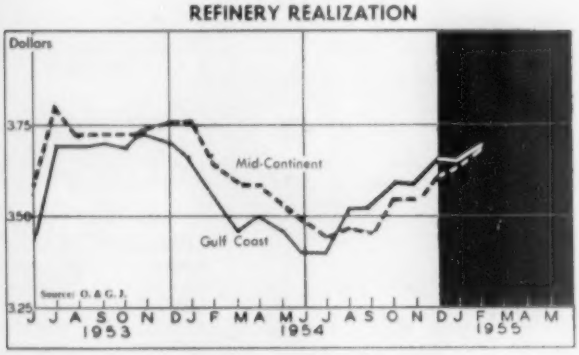
REFINERY YIELDS



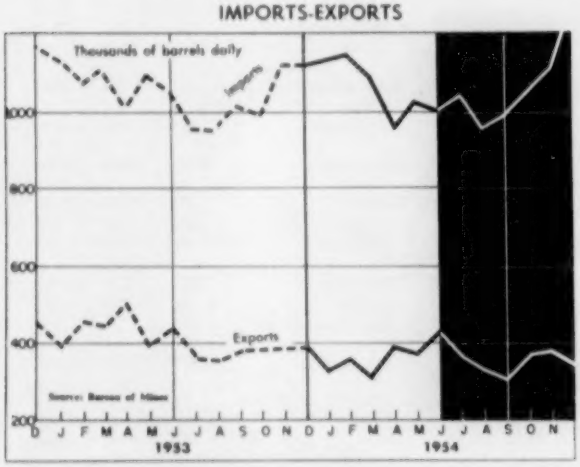
TOTAL DEMAND–AVIATION GASOLINE



REFINERY REALIZATION



IMPORTS-EXPORTS



REFINERY REALIZATION

	Feb.* 1955	Jan.* 1955	Dec. 1954	Feb. 1954
Mid-Continent	$3.70	$3.67	$3.62	$3.64
Gulf Coast	3.71	3.68	3.65	3.56

*Preliminary.

Refinery realization is based on yields of major products and average spot prices of regular gasoline, kerosine, No. 2 fuel, and residual as published in The Oil and Gas Journal.

Your MARKET PLACE FOR THE OIL AND GAS INDUSTRY... CLASSIFIED ADVERTISING

UNDISPLAYED CLASSIFIED 25c a word one issue. 10% Discount three or more consecutive issues. $4.00 minimum charge. Blind Box in our care nine words. Payable in Advance.

DISPLAY CLASSIFIED
$16.00 a column inch one issue . . .
10% Discount three or more issues.

Address Classified Advertising Material: The Oil and Gas Journal, P. O. Box 1260, Tulsa 1, Okla.

FOR SALE EQUIPMENT

SALES AND RENTALS of Rotary and Cable tools. E. A. Kelly, Okla. City, 3125 S. E. 29th St. Box 861. JA 5-6407.

CORE DRILLS, SPUDDERS, ROTARIES: New and used equipment. Everything in supplies. Fishing tools rented. Pressey & Son, Pueblo, Colo.

FOR SALE: ENGINE—165 Hp. Climax Model R61, maximum continuous Hp. rating 126. Herndon Drilling Company, 421 Mayo Building, Tulsa. Phone 4-9700.

FOR SALE—used GMC diesel motors—671, type 185 hp—can be used as twins—4 units, total price $2,000.00. BAW Industries—Rossville, Illinois.

80,000 BBL. floating roof API all welded and one 37,000 bbl. wood roof tanks located Brownstown, Illinois, both clean. Bargain for quick sale. W. C. Berry, P. O. Box 1858, Tulsa, Okla.

FOR SALE: 1—Beaird—Ingersoll-Rand packaged Compressor Plant, Type 6-JVG (165 H.P.) Heavy Duty, direct connected, 4-cycle, gas engine driven, single stage equipped with 3—4¼ x 9 compressor cylinders, three hand operated fixed volume pockets, two hand operated valve lifters, 20" O.D. 500# W.P. intake scrubber, air starting equipment and controls for automatic operation. Designed for intake pressure range 100#-250#, discharge pressure range 500#-600#. Delivery 3,480 MCF per day at 250# intake, 550# discharge. This plant has been in use less than 30 days and is located near Palestine, Texas. Box H-616, The Oil and Gas Journal, Tulsa, Oklahoma.

Gaso Duplex 4½" x 6" Power Pumps with Chrysler C-36 Engines, skid mounted, immediate delivery. Also Byron Jackson, Carter Centrifugal Units, Westinghouse 20-25-50 KW Generating Units.

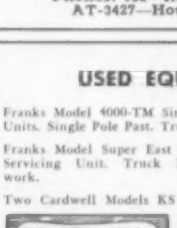
H. H. COFFIELD
Attn.: W. H. ORR
Phones: 132—Rockdale, Texas
AT-3427—Houston, Texas

USED EQUIPMENT

Franks Model 4000-TM Single Drum Well Servicing Units. Single Pole Past. Truck Mounted.

Franks Model Super East Texas Single Drum Well Servicing Unit. Truck Mounted. Handles 6500' work.

Two Cardwell Models KS Single Drum Well Servicing Unit. Single Pole Mast. Industrial engine. Mounted on trucks.



50/60 Ideco Skid Servicing Unit. Double Pole Mast. Mounted on International Tandem Truck.

O.C.S. Type 3 Servicing Unit mounted on 1942 Mack Truck. Located Odessa, Texas.

Write, Wire or Call

FRANKS MFG. CORPORATION
BOX 3218, WHITTIER STATION
TULSA, OKLAHOMA

FOR SALE EQUIPMENT

FAILING 1500 heavy duty drill with 4½x6 pump, automatic pulldown, and mounted on International truck. Write P. O. Box 819. Longmont, Colo. Phone 1333.

FOR SALE: Two R. L. Cardwell Double Drum Spudders with derrick type masts. Would sell complete with Dog House, Light Plant, Wirelines, and Tools or with any part of them. Write Box 871, Seminole, Okla.

SULLIVAN 200 A, 1948 Model, Combination Rotary and Core Drill. Good Condition. Will drill to 1500 feet and core to 2500 feet. For full information, write to Leslie Paris, 310 Classen Terrace Bldg., Oklahoma City 6, Okla.

FOR SALE at Drumright and Seminole, Oklahoma, 13,000' of 3" and 2,400' of 4" New Asbestos Cement Pipe, Bolted Couplings, 75c and 94c per foot. Deep Rock Oil Corp., Atlas Life Bldg., Tulsa, Okla.

FOR SALE—At Oklahoma City, two Electric Machinery Manufacturing Company belt-driven generators, 44 KVA, 35 KW, 480 volts, price $350.00 each. Cities Service Oil Company, Patridge, Bartlesville, Oklahoma.

GOOD #1 GRADE USED 8" LINE PIPE FOR LESS!
Save almost ½ the cost of new pipe.

Lapweld 8⅝" O.D. 28.55 used pipe. Straight single random lengths. Machine cleaned. Plain and bevelled or screw end. 850 to 900 PSI. Pipe located in Illinois. Will sell for cash, or will finance meritorious propositions.

REDNEB PIPE CO.
P. O. Box 1798, Shreveport, La.,
Phone 2-3276.

EQUIPMENT SPECIALS!

Columns: 8' x 28', 7' 6" x 56', 7' 4" x 70', 6'6" x 55', 6' x 27', 5' x 27', 30" x 34', 7' x 26' SS, 6' x 53' SS. 4' x 47', (250#), 2' x 45' (250#).

Heat Exchangers:
(1) 1,600 sq. ft. (Adm.), (2) 1,125 sq. ft. (850 lb.), (4) 500 sq. ft. (Adm.), (2) 800 sq. ft. (675# 800 F.), (5) 424 sq. ft. (Adm.), (5) 360 sq. ft., (4) 260 sq. ft.

60—Turbine and motor driven centrifugal pumps, SS & Steel, 1" x 1" to 8" x 8".
2—6-stage Pacific pumps 730 GPM.
2—Clark MA-4 150 BHP engines.
4 IR XVG-8 engines. Also 1 Clark RA-8.
Goulds 16" 10,500 GPM. Pump. 135 ft. hd.
Oliver Filters: 8' x 10', 5' 3" x 8'.
5' x 12', 4' x 6' Drum Flakers.
Lab. Petrochem Furnace.
5—300# Vessls: 10' x 35', 8' x 35'; 7' x 30'.
(1) 9' x 60' propane tank, 200#.

Detailed circular upon request.

BRILL EQUIPMENT COMPANY
4101 San Jacinto St., Houston 4, Texas, Locust 1351
New York Office, 2401 Third Ave.,
Telephone Cypress 2-5703
Sell us your surplus equipment

FOR SALE EQUIPMENT

FORT WORTH SPUDDER Super J-Keystone Model 50 on truck. Excellent condition. Also tools, trucks and pipe. Located in Cherryvale, Kansas. Carl Missimer, Russell, Kansas.

SALES and Rentals of cable drilling and fishing tools, casing and equipment, from the Southwest's largest stock of used cable tools and oil field supplies. Degen Pipe and Supply Co., Tulsa, Oklahoma.

GASOLINE Plant for Sale—operating—6 million foot capacity—located central Oklahoma—recovers natural and mixture. Box H-671, The Oil and Gas Journal, Tulsa, Oklahoma.

STAR 45-C CABLE RIG in A-1 condition. 10-in. seamless A-mast; 1300 Caterpillar Diesel engine. 15-in. down to 4-in. Tools. Fully equipped. Rated capacity, 3,000 ft. Also have 5 to 600 ft. of 12-in., 1,000 ft. of 10-in., 1,600 ft. of 8-in. seamless casing. Located near Independence, Kansas. Box H-661, The Oil and Gas Journal, Tulsa, Oklahoma.

GASOLINE PLANT *FOR SALE*

Gasoline Plant, located in Brazoria County, Texas, shut down in January, 1954. Had been processing approximately thirty-three million feet of gas daily with absorber pressure approximately six hundred thirty pounds. Plant recovered Propane, Butane, Gasoline, Kerosene and Diesel Oil. Adequate storage tanks for all products. Drum Lead Blending Plant. Detailed inventory available upon request.

SOUTHERN PRODUCTION CO., INC.
P. O. Box 670, Ft. Worth, Texas

IMMEDIATELY AVAILABLE

BOILERS—(8) 304 HP, 125 PSI, Kewanee, Firebox, ASME, complete. (1) 50 HP, 150 PSI, Titusville. (1) 500 HP, Heine, 180 PSI, 2-drum.
COLUMNS—11' x 84' bubble cap, 18 trays, 100 PSI.
9'x42'6" chrome lined, 150 PSI.
6'x37'2" chrome lined, 200 PSI.
35"x44" bubble cap, 18 trays, 18 caps per tray, 300 PSI.
DIESELS—(3) 2160 KW Busch-Sulzer, 3/60/2400/4160 Generators, complete. New 1943.
HEAT EXCHANGERS—1530 sq. ft. Admiralty tubes. 268 sq. ft. Reboiler, steel, welded, 4-pass.
PRESSURE TANKS—(2) 10'x40', 30 PSI.
(2) 7'x45' 13,000 gal. vert., 60 PSI.
(1) 7'x24' 7000 gal. vert., 150 PSI.
(4) 7'x22'6" 6500 gal. vert., 100 PSI.

Heat & Power Co., Inc.
310 Thompson Bldg., Tulsa 3, Okla.—
Phone: 3-4599
70 Pine St., New York 5, N. Y.—
HAnover 2-4890

FOR SALE EQUIPMENT

N-4 BREWSTER Single Drum Drawworks with one WAK Waukesha Engine—Less than 3 years old—Excellent condition—$11,000.00 —Contact Dick Schriber, Iverson Supply Company, Phone 7-2349, Odessa, Texas.

COMPRESSORS FOR INTEREST
in Gas Booster Plant. Will furnish type 80 Cooper Compressors for interest. Must have reasonable reserve. Box H-681, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: Three type 80 Cooper Gas Engine Compressors completely rebuilt. Two type 80 Cooper Compressors as is. One 100 H.P. Superior as is or rebuilt. One Clark 100 H.P. Gas Engine driven Compressor. W. S. Smith, 205 Thompson Bldg., Tulsa, Okla.

FOR SALE—Horizontal Duplex Steam Pumps—10x8½x12—353 GPM—bronze fitted —max. discharge pressure 100 lbs.—6" suction—5" discharge—mfg. by American Marsh Co. Quantity available—NEW—Boston Metals Co. 313 E. Baltimore St., Baltimore 2, Md., Curtis 7-5050.

HIGH PRESSURE CYLINDERS—4 Ingersoll-Rand Type 43K11313 4½" x 15". Have seen limited service, available immediately. Please contact Texon Gas, Inc., 2311 Liberty Bank Bldg., Oklahoma City, Oklahoma.

COMPLETE DRAW WORKS UNIT consisting of Unit 10 draw works and draw works compound including two LeRoi Model E 1500P7 (350 Hp.) draw works power, skid, pump drive and drive sheave. Cimarron Drilling Company, 419 Stanolind Bldg., Tulsa.

FOR SALE—At Oklahoma City a large stock of new Bessemer engine compressor parts at a big reduction. We have just closed down our last plant equipped with Bessemer Type 10 engine compressor units. Complete list and prices. Cities Service Oil, Patridge, Bartlesville, Oklahoma.

FOR SALE OR LEASE—Plush Lockheed executive transport. Completely equipped and available for immediate service. Excellent radio, auto-pilot, two zero time engines. All for $120,000. Have stock of new and used Beechcrafts. Atlantic Aviation Corp., Teterboro Airport, Teterboro, New Jersey. Hasbrouck Heights 8-1740.

JUST PURCHASED
Complete Compressor Station

6 Ingersoll-Rand KVG-Engines Rated at 660 and 600 horsepower at 330 R.P.M. Units are complete with accessories. Large inventory of new spare parts. Units are Priced right for immediate disposal.

Detailed Information on Request.

BRILL EQUIPMENT COMPANY

4101 San Jacinto St., Houston 4, Texas. Locust 1351
New York Office, 2401 Third Ave.,
Telephone Cypress 2-5703

Sell us your surplus equipment

EQUIPMENT WANTED

WILL CONSIDER buying or leasing used seismograph equipment and trucks. Must be in good condition and reasonably priced. Please give full description, prices and present location in first letter. Box H-565, The Oil and Gas Journal, Tulsa, Oklahoma.

WILL PAY highest prices for used casing, used line pipe, abandoned leases, or other surplus lease equipment. Your idle producing equipment is worth dollars. Green Pipe & Supply Co., Box 1383, Tulsa, Oklahoma.

WANTED: Double drum machine with twin pole mast capable of servicing 3000 ft. wells. would prefer Cardwell or Cooper. Robert Wharton, R.D. 3, Burgettstown, Pa.

WANTED—good used pipe suitable for low pressure gas lines. Need approximately 10,000 feet of 20", 18", 16", 10", 8", and 6". Write, wire, or call amount, condition and price to Odessa Natural Gasoline Company, P. O. Box 3908, Odessa, Texas, Phone 6-3241.

HELP WANTED

EXCELLENT OPPORTUNITY for Geologist, under 35, with established independent oil company. Outline experience and personal history. P. O. Box 2775, Dallas, Texas.

HELP WANTED

FOREIGN EMPLOYMENT. List of oil companies and drilling contractors showing where to apply for foreign jobs. OIML Co., Box 2603, Tulsa, Okla. $5.00 cash.

PETROLEUM ENGINEER with Masters Degree, or Doctor's in Chemical, Mechanical, or Petroleum Engineering, for research and teaching in Reservoir Mechanics and related fields at rapidly growing Southwestern institution. Rank and salary open, twelve months employment possible, consulting work encouraged and available in immediate area. Applications will be kept confidential. Box H-570, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: Graduate Engineer by independent oil company. Experience in drilling, completion, and workovers in the Illinois Basin. Give details of experience and salary expected. Box H-630, The Oil and Gas Journal, Tulsa, Oklahoma.

BOOKKEEPER-AUDITOR needed by independent oil and gas producer in East Texas. Prefer individual with at least five years experience in oil and gas accounting, including local, state, and federal taxes and royalty accounting procedure. Nice salary. Replies confidential. Box H-680, The Oil and Gas Journal, Tulsa, Oklahoma.

ENGINEERS—For well established manufacturing company. Experienced Engineers for the design and development of Oil Emulsion Treating Equipment, Gas Dehydrators, Stabilizers, Desulphuring Units and other Oil and Gas Well Production Equipment. Must be capable of taking complete charge of project. All information confidential. Reply: Chief Engineer Union Tank and Supply Company, P. O. Box 2092, Houston 1, Texas.

SALES MANAGER

Man between 25 and 40 with oil field selling experience to take charge of 15 manufacturers agents soliciting business for manufacturer of portable houses for drilling rigs. Write

Box H-651, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST

Active independent oil company has opening in Tulsa office for qualified subsurface geologist. Must have well-rounded experience in Mid-Continent Area, particularly Oklahoma, and must be capable of handling geological operations at divisional level. Age limit 40. Excellent position for right party. Give complete summary of experience and qualifications in letter. All replies confidential.

BOX H-650,
THE OIL AND GAS JOURNAL,
TULSA, OKLAHOMA.

CARIBBEAN REFINING CO.

New Complete Petroleum Refinery
Located near
SAN JUAN, PUERTO RICO
has immediate need for
EXPERIENCED REFINERY PERSONNEL

OPERATING SUPERINTENDENT
MAINTENANCE SUPERVISOR
SHIFT FOREMEN AND OPERATORS
Distillation, Fluid Cat. Cracking,
Gas Recovery and Cat. Poly.

CHIEF CHEMIST
Experience in product blending required.

FIRE FIGHTING AND SAFETY INSTRUCTOR

CHIEF INSTRUMENT MAN

Write, giving resume, to

Caribbean Refining Company

P. O. Box 1581, Corpus Christi, Texas

HELP WANTED

ARE YOU MOVING to Oklahoma City, or want to make a change? Independent oil company with main offices in Oklahoma City has opening for efficient Secretary 35 to 50 years age. Must be expert stenographer with lots of experience in oil production and operations. Must be unencumbered; non-alcoholic and have own transportation. Salary open. Box 1824, Okla. City.

PALEONTOLOGIST, with 5 to 15 years of post-graduate experience, for employment with major oil company. Duties would include supervision of paleontological work in Rocky Mountains. Salary based on training and experience. Box H-667, The Oil and Gas Journal, Tulsa, Oklahoma.

CHEMIST, Petroleum, with varied experience wanted for So. California manufacturer of industrial specialties, additives, etc. for research and/or sales. Box H-660, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEER, Production and Water Flood experience to take complete charge of field operations, Illinois Basin. Give age, experience, and salary expected. All replies confidential. Our employes know of this ad. Box H-669, The Oil and Gas Journal, Tulsa, Oklahoma.

PLANT MANAGER

Large Mid-West Independent wants experienced man to manage operations of their Asphalt Refinery located in the Chicago area. Must have a record of successful experience in the Refining and handling of Asphalts. Salary open. Excellent opportunity for right man. Reply to

BOX H-638,
THE OIL AND GAS JOURNAL,
TULSA, OKLAHOMA.

PETROLEUM ENGINEERS

Major oil company has openings for graduate Junior & Senior Petroleum Engineers in its operations in Venezuela. Salary commensurate with experience.

Please send details of exp. to:

P. O. BOX 35
BOWLING GREEN STATION
NEW YORK 4, N. Y.

PETROLEUM ENGINEERS

Experienced graduate engineers or recent graduates, for immediate and future job openings in Saudi-Arabia and New York City. For engineering work in development, production, drilling, process, and oil and gas engineering on primary and secondary recovery problems.

Salaries commensurate with education and experience. Write giving full particulars regarding personal history and work experience. Please include telephone number.

Recruiting Supervisor, Box 40

ARABIAN AMERICAN OIL COMPANY
505 Park Avenue
New York 22, N. Y.

HELP WANTED

PETROLEUM ENGINEER wanted by independent producing company in Billings, Montana. Must have engineering degree and 3 to 5 years practical experience in drilling and production. Reply should describe education, experience and salary required. Interview will be arranged if qualifications meet requirements. All replies will be kept confidential. Reply to DeKalb Northern Oil Division, 3021 Sixth Ave. North, Billings, Montana.

WATER-FLOOD ENGINEER—by independent oil-producing company. Should have field experience in Mid-Continent area water-flood development and operation. Reply should state qualifications and experience in detail. All applications confidential. Box H-673, The Oil and Gas Journal, Tulsa, Oklahoma.

DRILLING REPRESENTATIVE
Major drilling contractor has opening for contact and public relations representative for Texas. Must have excellent character, reputation, and personality, and be well acquainted with oil company officials. Prefer man between 30 to 40 with drilling experience. Furnish references, past employment record, and full personal data in reply. Box H-682, The Oil and Gas Journal, Tulsa, Oklahoma.

PARTY CHIEF-SEISMOLOGIST AND OBSERVER

Experienced men needed to expand geophysical organization of major oil company. Write, giving personal, educational and experience qualifications and references. All replies confidential.

Box H-664
The Oil and Gas Journal, Tulsa, Okla.

CHIEF ENGINEER

We offer an immediate opening with one of the industry's oldest and largest manufacturers of oil field producing equipment.

Must have a degree in mechanical or petroleum engineering; three or more years experience in supervising a department; three or more years field experience in the installation and operation of producing equipment; and at least an "engineering experience" with welding shop operations and procedures.

Must have a sound knowledge of thermodynamics as applied to the design of combustion equipment, heat exchangers, emulsion treaters, dehydrators, etc., as well as the know-how to design process and oil field production equipment.

Write and give full details of personal history and work experience and, if possible, include a photograph.

Box H-684, The Oil and Gas Journal, Tulsa, Oklahoma.

SITUATIONS WANTED

GEOLOGIST—master's degree, major company experience in Cuba. Surface, subsurface, log interpretation, micropaleontology. Three years in foreign exploration, fluent Spanish. Employed. Desires position in Cuba. Box H-683, The Oil and Gas Journal, Tulsa, Oklahoma.

REFINERY ENGINEER, equipment inspector, or mechanical supervisor. Seven years experience wide range refinery equipment. Supervisory experience. Familiar all codes, vessels, piping, etc. Turnaround planning, coordination. Maintenance, corrosion control, estimating. Budget preparation. Materials movement and handling. Graduate engineer. Knowledge Spanish. Prefer another foreign assignment. Box H-653, The Oil and Gas Journal, Tulsa, Oklahoma.

NAVAL OFFICER (Supply), unmarried, (Annapolis, '50), speaks Portuguese, available June executive position management, major Company. Box 986, Phone 6-3232, Muldrow, Oklahoma.

DRILLING AND PRODUCTION Superintendent: Presently employed by Major Company desires change to independent with possible chance for participating. Graduate petroleum engineer. Also experienced in gasoline and recycling plant supervision. Geology. Landwork throughout most of Texas. Box H-656, The Oil and Gas Journal, Tulsa, Oklahoma.

ALL AROUND MAN available, 20 years experience drilling and production, gas and oil, deep and shallow, high and low pressure wells, workovers. 43 years of age, sober, best of references. Box H-666, The Oil and Gas Journal, Tulsa, Oklahoma.

SITUATIONS WANTED

PETROLEUM ENGINEER, 34, graduate, eight years engineering and three years production experience with major oil company in West Texas. Desire change to independent in drilling, production or workover operations. Box H-676, The Oil and Gas Journal, Tulsa, Oklahoma.

LANDMAN, 29, 4 years experience, lease buying, title work, farmouts, with major company, desires employment with independent or small company. Box H-677, The Oil and Gas Journal, Tulsa, Oklahoma.

ASPHALT CHEMIST, sixteen years experience all phases paving, industrials, specialties. $7500 required. Box H-657, The Oil and Gas Journal, Tulsa, Oklahoma.

NEW PRODUCTS

NEW PRODUCTS for license, outright sale, or franchise. Monthly digest—$1.00. Ten dollars annually. Digest D1, Box 2052, Austin, Texas.

BUSINESS SERVICE

Delaware Corporations formed and serviced. American Guaranty & Trust Company P. O. Box 487, Wilmington, Delaware

REAL ESTATE

AMBASSADOR HOTEL, Palm Springs, Calif. Property you'd be proud to own, and a tax saver.

PLAT SHEETS

NEW KRAFTBILT PLAT SHEETS will solve your plotting problems. Choose from a broad selection of sizes, scales and paper types. Contrasting lines are sharp and clean. Bond, ledger and tracing papers are top quality. Our line is complete! Ask for Bulletin 155-W. Ross-Martin Co., P. O. Box 800-A, Tulsa 1, Oklahoma.

WANTED

WANTED—proven production. Independent oil company has cash to invest. Send complete information including engineering. Prefer to deal direct with principals. Box H-675, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: Independent or group, with organization of technical and financial resources interested in a foreign operation, Guatemala, Central America. To explore and the possibility to drill for oil. At present can secure some of the best concessions. For further information and plans, write to Dr. Fernando Sarti, 7112 Fir Street, Houston 17, Texas.

WANTED—IDEAS

Inventions that are related or can be adapted to the oil industry. We offer capital, technical advice, patent assistance, market research, a manufacturing plant, and a sales outlet; everything to put your invention on the market. Write P. O. Box 1665, Houston 1, Texas.

FINANCIAL BACKING wanted by young married man, honest, hard working to prospect and locate uranium claims in new district in Colorado Plateau. Experienced, prospector, ready to go. Full information furnished and references exchanged. Fifty per cent interest given. Good chance to make fortune. Box H-679, The Oil and Gas Journal, Tulsa, Oklahoma.

WILL CONDUCT a limited number of free underground oil surveys to test new invention. Herman Bernau, Ogden, Iowa.

BUSINESS OPPORTUNITIES

E. WIDEKIND & CO., 8, Volksgartenstr., Duesseldorf (West Germany), an old-established, well introduced Concern specializing exclusively in the manufacture of Industrial Gas Plants (solid fuel, such as Coal, Lignite, etc.) seeks connection with a U. S. firm that has developed a process for complete degasification (vaporization) of oil. Purpose: collaboration and taking over such process for Germany. Information re E. Widekind & Co., can be obtained from F. G. Poppenbuerger, Chanin Bldg., Suite 4200, 122 East 42nd Str., New York 17, N. Y.

URANIUM INVESTORS. We are now in a position to offer investors a special service. A Fee of $250. will locate and file a claim for you in Colorado or Utah. We can handle only ten accounts weekly. Therefore for quick service write now for further information and your account number. Uranium Prospectors & Investors Exchange. 516 N. 8th St., Independence, Kansas.

ROYALTIES

PIPELINES ANNOUNCED: Projected pipelines indicate increasing action in central Williston Basin, where we specialize in royalties in major company blocks. For informative material, write LANDOWNERS ROYALTIES COMPANY, Box 1225, Great Falls, Mont.

NEW CUSTOMERS SOLICITED. You can now make very small investments on income Royalties or those ahead of Drilling. A. S. Berry, P. O. Box 1383, Tulsa, Okla.

OFFERING CHOICE PRODUCING oil income royalties with large reserves per Dollar investments. A. S. Berry, P. O. Box 1383, Tulsa, Okla.

JACK EAGLE, Oil Properties, 708 City Nat'l. Bldg., Oklahoma City, Oklahoma, Telephone REgent 6-7027.

LEASE AND DRILLING BLOCKS

780 ACRES—producing approx. 28 bbls. daily—room for expansion—on pipeline—E. Kansas. A STEAL at $19,500. J. E. Moherman, 326 E. 12th, Ottawa, Kansas.

570 ACRES, Creek County, north half of section 22 and south half of section 15-17-9. Offset oil production south and west. Loyd R. Bruce, Phone 7-8937, Tulsa.

I KNOW OF 80,000 acres Tennessee, 100,000,000 ft. timber, all minerals, $6 acre, good tax buy. E. Jester, 1831 Miramar, Los Angeles 57, Calif.

FOR LEASE: excellent water-flooding property, surrounded by production. 200 to 1000 acres. Core Analysis indicates from 6,000 to 10,000 barrels of 40° gravity oil recoverable per acre. Depth 1200 feet. Plenty of fresh water available. Box H-678, The Oil and Gas Journal, Tulsa, Oklahoma.

Will pay cash instantly for lease (large blocks), royalties, mineral deeds, production. Write fully—P. O. Box 2153, Denver, Colorado.

CONTACT A. L. Bowles, Box 947, Ada, Okla., for Drilling Deals, Oil Investments.

DUE TO DEATH in family of interest owner, we are forced to sell two producing and one non-producing leases in Montgomery County, Kansas. Bartlesville sand production. Carl Missimer, Russell, Kansas.

DRILLING Contractor will develop acreage for reliable independent operator for interest in production. Write Box H-662, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: South ½ of S.E. ¼ of NW ¼ of Sec. 19 Township 5 North Range 9E., Hughes Co., Okla. Consisting of 23½ acres. Two producing wells & fully equipped with two storage tanks and heater. Write Pittsburg Development Corp., Highland, Ill., for further details, or telephone attention of Mr. Hank Weder.

COURT SALE
To settle estate the following lease to be sold to the highest bidder for cash: Undivided 15/64 of 7/8 W.I. (subject to ORR) in producing lease with 4 Permian wells described as SW¼ of Sec. 11-22S-37E, Lea County, New Mexico. Oil and gas income to interest being sold now averaging about $1,000 per month. Sale to be held at court house in Lovington, on March 25, 1955. Address inquiries to Trust Department, First National Bank and Trust Company of Tulsa, Box 2240, Tulsa, Oklahoma.

LEASES ROYALTIES

Producing and Nonproducing
Bought and Sold—Any Area

Inquiries Invited

B. D. BUCKLEY

6635 Delmar Ave., St. Louis, Mo.

URANIUM

URANIUM

acreage and claims in New Mexico and Arizona for sale or assignment by owner.

WRITE R&B, DEPT. A
Albuquerque, New Mexico

EQUIPMENT MEN

Welex Jet Names Three To District Sales Posts

O. R. PAYNE

R. E. DIXON

B. COLCLASURE

O. R. (Mickey) Payne has been promoted to the position of district manager at Gainesville, Tex., R. E. (Gene) Dixon has been appointed assistant district manager for the Ardmore, Okla., district, and Bob Colclasure has been named sales engineer at the Great Bend, Kans., district office, according to recent announcements by Welex Jet Services, Inc., Fort Worth oil-well service company.

Payne has been with Welex for 4 years in oil-well service work. He worked successively as a rigman, a shooter, and sales engineer of the Welex Abilene, Tex., district office before attaining his present position.

Dixon, who will work from Duncan, Okla., has been with Welex approximately a year. Before joining the perforating company, he spent 18 years in oil-well service work as a rotary driller, a tool pusher, and with mud-service organizations.

Colclasure has been with Welex for 1½ years, serving as a rigman and shooter before attaining his present position.

Knudsen Named General Manager, Detroit Diesel

The appointment of Semon E. Knudsen as general manager of Detroit Diesel Division of General Motors Corp. effective March 1, has been announced by Harlow H. Curtice, president of General Motors.

Knudsen, son of the late William S. Knudsen, president of General Motors from 1937 to 1940, succeeds William T. Crowe, who is retiring after 35 years' service with General Motors.

Knudsen goes to Detroit Diesel from G.M.'s Allison Division where he has been manufacturing manager for aircraft-engine operations since December 1954. He joined General Motors as a process engineer at Pontiac Motor Division in 1915. At Pontiac, he was successively chief inspector, defense plant, superintendent of the car-assembly plant, and assistant general master mechanic before he was appointed director of the process development section of General Motors in 1949.

Truitt Is Sales Manager, Diamond Oil Well Drilling

C. B. (Ike) Truitt has joined Diamond Oil Well Drilling Co., Midland, Tex., in the capacity of general sales manager.

Truitt is widely known throughout the oil industry through his past associations in engineering and sales with Hanlon-Waters, Inc., A. O. Smith Corp., and Grove Regulator Co. Just prior to his coming with Dowdco he was vice president in charge of marketing and operations for Hiwan Petroleum Co., Houston.

To manage the sales activities of Dowdco in the field of sales and rentals of diamond core bits, core barrels, diamond drilling bits, and allied diamond equipment for oil wells, Truitt will make his residence in Midland.

Parry Joins France Packing As Sales Representative

R. E. PARRY

Ray E. Parry, formerly with Clark Bros. Co. in Olean, N. Y., has joined France Packing Co. as a sales representative. Parry joined the Clark organization in 1945 in its engineering department where he served in various capacities up to assistant department manager.

France Packing Co., producers of mechanical compressor packing, industrial piston rings, and valve plates, have appointed Parry a territory manager. He will operate in Michigan, Ohio, Indiana, and Kentucky.

OPW Corp. Names Maris As Sales Engineer

D. A. MARIS

Dean A. Maris has been appointed as a sales engineer for OPW Corp., Cincinnati, Ohio, Roy W. Gronauer, general sales manager, has announced. Maris will serve in an advisory and technical capacity to district managers and jobbers marketing OPW products to the oil and chemical industries.

Fabricated Products Names McKee Sales Manager

Waldo McC. McKee has been appointed sales manager of the fabricated products division of M. W. Kellogg Co., a subsidiary of Pullman, Inc. He has been assistant sales manager of this department since 1944. A mechanical engineer, McKee joined Kellogg in 1928 and, since then, has been closely associated with the commercial development and the design, fabrication, and erection of high-pressure, high-temperature power-plant piping and welded pressure vessels.

B. & W. Tubular Division Announces Sales Changes

A number of changes among the district sales offices of the Tubular Products Division of Babcock & Wilcox Co., has been announced by James S. Anderson, general sales manager of the division.

F. T. Murphy, J. N. Rogers, and C. J. Ponsot have been named to handle the sales of the division's products in the St. Louis area. They succeed Randolph Wohltman who resigned after serving as the division's sales agent in the area for over 28 years.

The former sales office in Houston of Globe Steel Tubes Co. has been consolidated with B. & W.'s Tubular Products Division sales office there. A. M. Johnson, who handled Globe sales in the territory has moved into the sales headquarters of B. & W.'s Tubular Products Division at Houston. G. H. Weight, southwestern sales manager, is in charge of all Tubular Products Division sales activities in the area.

The former sales office in Cleveland of Globe has been consolidated with B. & W.'s Tubular Products Division sales office in the city. J. J. Lukens, who handled Globe sales in the territory, has moved into the sales head-

ADVERTISERS IN THIS ISSUE

Aber Company, Inc., The 156
ACF Industries, Incorporated, Valve Division 20
Ajax Iron Works 32
Allis-Chalmers Mfg. Co. 8
Alprodco, Inc. 185
Allen Foundry & Machine Works, Inc. 64
American Iron & Machine Works Co. 157
Ammann Photogrammetric Engineers, Inc., Jack 186
Anchor Petroleum Company 74
Baash-Ross Tool Company 199
Baird Mfg. Co. 156
Baker Oil Tools, Inc. 73
Baroid Division, National Lead Company 207
Beaird Company, Inc., The J. B. 21, 22
Beavers and Associates, V. L. 156
Beech Aircraft Corp. 100, 101
Bethlehem Steel Co. 93
Black, Sivalls & Bryson, Inc. 60
Bos-co Equip't Eng'r'g & Mf'g 164
Bovaird Supply Co., The 44
Braun & Co., C F 164
British Petroleum Company Limited, The 130
Brodie Co., Inc., Ralph N. 42
Brown Oil Tools, Inc. 9
Brown-Raymond-Walsh 184
Buda Division Allis-Chalmers Manufacturing Company 172
Buffalo Forge Company 61
Byron Jackson Co. 47
Cameron Iron Works, Inc. 165
Carbide and Carbon Chemicals Company, A Division of Union Carbide and Carbon Corporation 40
Cardwell Mfg. Co., Inc. 62, 63
Caterpillar Tractor Co. 138
Chain Belt Co. 66
Champion Spark Plug Company 14
Chrysler Corp., Dodge Division 53
Clark Equipment Company 43
Classified Advertising 219, 220, 221, 222
Cleveland Trencher Company, The 167
Coast Paint & Lacquer Co., Inc. 18
CF&I Tubular Products, The Colorado Fuel and Iron Corporation 23
Continental Supply Co., The 69
Crose Manufacturing Co., Inc., M. J. 150
Cutler-Hammer, Inc. 41
D+B Division Emsco Manufacturing Company 69
Darling Valve and Mfg. Co. 29
Dean Brothers Pumps, Inc. 153
Dow Chemical Company, The 149
Dowell Incorporated 103, 161
Drilling & Service, Inc. 205
Eastman Chemical Products Co. 37
Edward Valves, Inc. 155
Emsco Manufacturing Company, D+B Division 69
Enardo Manufacturing Co. 204
Ensign Carburetor Company 54
Evinrude Motors Division of Outboard, Marine & Mfg. Co. 177
Fabri-Valve Company of America 153
First National Bank & Trust Co. of Tulsa, The 147
Gardner-Denver Company 18
General American Transportation Corporation 146
General Electric Co., Electronic Dept. 45
Geolograph Company, Inc., The 194
Geophysical Service, Inc. 202
Goodyear Tire & Rubber Company, The 11
Gott Mfg. Co., H. P. 153
Grancell, I. H. 158
Guiberson Corporation 171
Gustin-Bacon Manufacturing Co. 203
Halliburton Oil Well Cementing Co. 7, 143
Harbison-Fischer Mfg. Co. 190
Hartwell & Son, Inc., H. N. 52
Hercules Tool Company 157
Hill, Hubbell and Company Division of General Paint Corporation 50
Houston Oil Field Material Company, Inc. 178
Hughes Tool Co. Back Cover
Inferno Co., The 156
Jensen Brothers Mfg. Co., Inc. 188
Johns-Manville Corporation 45
Johnston Testers, Inc. 51
Jones & Laughlin Steel Corporation Supply Division 26, 27
Jones Company, The S. M. 19
Kaiser Steel Corporation 30
Kellogg Co., The M. W. 25
Kewanee-Ross Corporation 17
Kinzbach Tool Co., Inc. 194
Kobe, Inc. 200
Lane-Wells Company Inside Front Cover
Larkin Packer Company, Inc. 163
Layne & Bowler, Inc. 10
Lufkin Foundry & Machine Co. 34
Lufkin Rule Co., The 168
Mack Trucks, Inc. 24
Macwhyte Co. 5
Magnet Cove Barium Corp. 56
Marathon Corporation 198
Mark & Company, Clayton 148
McCullough Tool Company 133
Miller Sand Pump Co. 156
Mission Mfg. Company 58, 59
Moorlane Company 152
Morse Chain Company 49
Muldrow Aerial Surveys Corp. 192
Murphy Diesel Company 154
National Aluminate Corp. 93
National Bank of Tulsa 208
National Tank Company 224
Nicolet Industries, Inc. 150
Nordstrom Valve Division, Rockwell Manufacturing Company 175, 176
Norris Manufacturer, Inc., W. C. 70
Oil and Gas Journal, The 63, 194
Oil Center Tool Co. 55
Oil Well Supply Division 6
Onan & Sons, Inc., D. W. 193
OPW Corporation 4
Orbit Valve Company 97
Otis Pressure Control, Inc. 187
Outboard Marine & Manufacturing Co. 177
Pacific Car and Foundry Company 206
Parkersburg Rig & Reel Co. 137
Peerless Supply Co. Inc. 147
Penn Controls, Inc. 151
Petroleum Distributing Co. 197
Petroleum Electric Power Assn. 28
Ramsey Company, Inc., Stan 164
Rector Well Equipment Co., Inc. 67
Reed Manufacturing Company 148
Reed Roller Bit Company 134, 135
Rockford Clutch Division of Borg-Warner Company 189
Ross-Martin Co. 194
Rouse & Sons, Max 184
R-P&C Valve Division American Chain & Cable 168
Seismograph Service Corp. 193
Sievers Company 144
Smith Corporation, A. O.—Hydraulics Products 12
Tubular Products Division 33
Smith & Son, Inc., Ray L. 147
Socony-Vacuum Oil Co., Inc. 35
Solar Aircraft Company 169
Stewart & Stevenson Services, Inc. 48
Stoody Co. 181
Taylor Forge & Pipe Works 158
Tex-Tube Inc. 39
Thompson Tool Co. 201
Thornhill-Craver Co. 31
Tuboscope Company 15
Tulsa Crating Co. 164
Twin Disc Clutch Co. 196, 197
Union Asbestos & Rubber Company 68
Union Carbide and Carbon Corporation, Carbide and Carbon Chemicals Company 40
Union Tank and Supply Company 177
Unit Rig & Equipment Co. 191
United States Steel Corporation—Oil Well Supply Division 6
Victaulic Co. of America 57
Waukesha Sales & Service, Inc. 13
Well Equipment Mfg. Corp. 174
Willys Motors, Inc. 36, 192, 193
Willys Motors, Inc., Industrial Engine Department 36
Wilson Manufacturing Co., Inc. 38
W-K-M Manufacturing Company, Inc., A Subsidiary of ACF Industries Incorporated 195
Youngstown Sheet and Tube Company Inside Back Cover

quarters of B. & W.'s Tubular Products Division in Cleveland. The Cleveland office will be under the general supervision of the division's Beaver Falls district sales manager, James A. Cook.

The former sales office in Detroit of Globe has been consolidated with B. & W.'s Tubular Products Division sales office. F. H. Foglesong, district sales manager of B. & W.'s Tubular Products Division will supervise the sales of the division's tubular products as well as welding fittings.

On January 3 the stockholders of Globe Steel Tubes Co., Milwaukee, approved the purchase of its assets and business by Babcock & Wilcox Co.

Murphy and Ponsot were associated with the St. Louis sales office of Globe Steel Tubes Co. Rogers has been associated with the Chicago sales office of B. & W.'s Tubular Products Division. The new St. Louis sales headquarters will be under the general supervision of the division's Chicago district sales manager, Leon B. Wohlgemuth.

Mountain Iron Opens New Store at Kimball, Neb.

A new Mountain Iron & Supply Co. store with a full inventory of oil-field supplies, has been opened in Kimball, Neb., according to a statement released by S. O. (Bud) Beren, the company's vice president and general manager at the division office in Wichita, Kans.

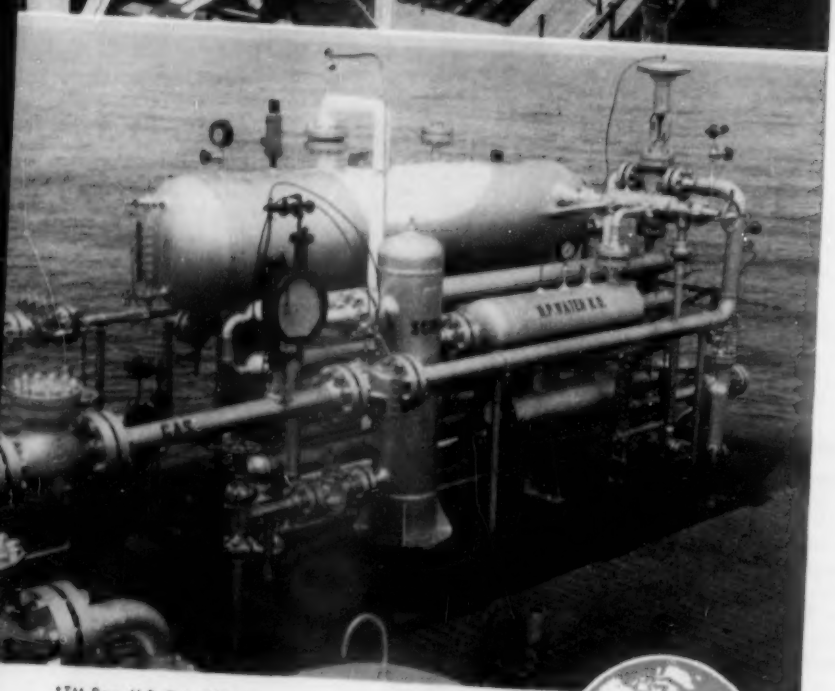
Kimball is located in the southwest corner of the state, close to the Colorado and Wyoming borders and will, therefore, enable the company to give better service and faster delivery of supplies to operators in the Julesburg and surrounding region, according to Beren.

The addition of the Kimball store makes the fourteenth location for the oil-field supply firm. Other locations are in Kansas, Oklahoma, West Virginia, and Colorado.

W. E. (Bill) Frevert is sales manager of Mountain Iron's Rocky Mountain division, and Donald E. Vossen has been appointed superintendent of the store. Vossen has been in the supply field for over 9 years and has also had considerable experience with drilling companies.

LEGAL

SEALED BIDS will be received until 2:00 P. M., Mountain Standard Time, March 22, 1955, and opened at that time in the Office of the Superintendent, Blackfeet Indian Agency, Browning, Montana, for the leasing of 4,080.97 acres of Tribal land and 33,475.84 acres of allotted Indian land, located in Pondera and Glacier Counties, Montana, for oil and gas mining purposes. The details of lease offerings and how and where to file bids may be obtained by addressing the inquiry to the Superintendent of the Blackfeet Indian Agency at Browning, or call the Agency Land Office, Phone 2561, Browning. Charles S. Spencer, Superintendent.



OCEAN GOING LTX*

Eight miles off the coast of Vermillion Parish, Louisiana, in 40 feet of Gulf water, stands the first "ocean going" gas gathering line. Four directionally drilled gas-condensate wells are produced. Liquid is separated AT THE WELL.

The following standards for the separation equipment were set by the producing company:

1. Take shutin pressure of 3000 p.s.i. and step down to 1200 p.s.i. for pipe line.
2. Processed gas could contain no more than 14 lbs. water per MM cu. ft. with 7 lbs. preferred.
3. Separate maximum amount of distillate and free water.
4. Individual units for each well with minimum capacity of 10 MM cu. ft./day.
5. Added safety equipment to automatically shut in wells in event of disturbance.
6. Units had to be compact and complete with a mud and sand trap along with gas and distillate meter runs.

National equipment exceeded these specifications. NATIONAL LTX UNITS WERE CHOSEN.

First gas began to flow in early 1951 WITH A REMARKABLY LOW WATER CONTENT OF 4 LBS. PER MM CU. FT. OF GAS.

May we help you in solving your distillate extraction problems? Write for a paper covering full description of this installation.

*TM Reg. U.S. Pat. Off.

It's a National

NATIONAL TANK COMPANY

TULSA, OKLAHOMA

YOUNGSTOWN LINE PIPE ...UNIFORM QUALITY, ACCURATE BENDING

●The secret of bendability is uniform, high quality steel. Youngstown Electric Weld Line Pipe is uniform in quality for accurate bending. It has the right physical and chemical properties to bend readily to fit the contour dictated by the terrain. It bends quickly, evenly, smoothly—and holds its roundness. For these reasons, men on the job prefer to work with Youngstown.

SPECIFY QUALITY V YOUNGSTOWN SERVICE

ELECTRIC WELD **LINE PIPE**

THE YOUNGSTOWN SHEET AND TUBE COMPANY

Manufacturers of Carbon, Alloy and Yoloy Steel

General Offices: Youngstown 1, Ohio • Export Office: 500 Fifth Avenue, New York 36, N. Y.

We drill dry holes . . . on purpose

We drill our "dry holes" — hundreds per year — in the research laboratory . . . and they *produce* better rock bits . . . bits that enable you to drill wells faster and more economically. We drill these "dry holes" to test bit designs and materials under simulated field conditions. Facts learned from these HUGHES tests have helped to produce bits that are saving days in drilling wells and have made it possible to drill areas that otherwise would not have been drilled. Our "dry holes" have played an important part in aiding the producing industry to add billions of barrels to the oil reserves.

HUGHES
TOOL COMPANY
HOUSTON, TEXAS
WORLD STANDARD
OF THE INDUSTRY